INDUSTRIAL ARTS and VOCATIONAL EDUCATION

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Establishing the General Shop

*William E. Warner**

Part I

MANY people do not realize the widespread significance of the most recent development in industrial arts and vocational education, the *general shop*. The idea of the general shop is scarcely 20 years old and in its present development is less than 10 years old. Examples of this type of organization are seen in almost every form and level of schoolwork.

The program of many of the more modern elementary schools is now including what is called an "activities" room or laboratory. Here youngsters of any of the first six grades may go to carry out special projects involving experimentation and manipulation of various materials and equipment not usually common to the standard classroom. Such a room in a school of this type is usually centrally placed on the first floor and is sufficiently large in size to accommodate permanent apparatus, as well as projects that involve open floor space. In addition to this special room or laboratory will be found a good-size storage room, a teacher's office and library, a fireproof room housing a kiln, a ceramics room, ample show- or display-case facilities, possibly an industrial museum, filing provisions, and a comprehensive tool crib. Children of any of the six grades may be found in this room at any hour working with a sympathetic and widely experienced man or woman. The additional equipment for such a room will usually be quite flexible and consist of: workbenches and tables, probably a printing press with the accompanying equipment, and animal cage, bookbinding equipment, extensive cupboard space including a zinc-lined bin and cupboards for clay and clay projects, spinning wheels and at least one large loom, extensive drawer space for the filing of various kinds of paper, adequate sink and lavatory facilities, a stove or electric hot plate, a wringer and accompanying pans, provisions for the making of paper, as well as electrical outlets for the use of an electric flatiron or sewing machine, etc.

This same general idea for a general shop is rapidly finding a place in rural and consolidated schools. It is accessible to boys and girls from the first grade on through the twelfth, and is oftentimes restricted to a basement room, but as better schools are built, a more

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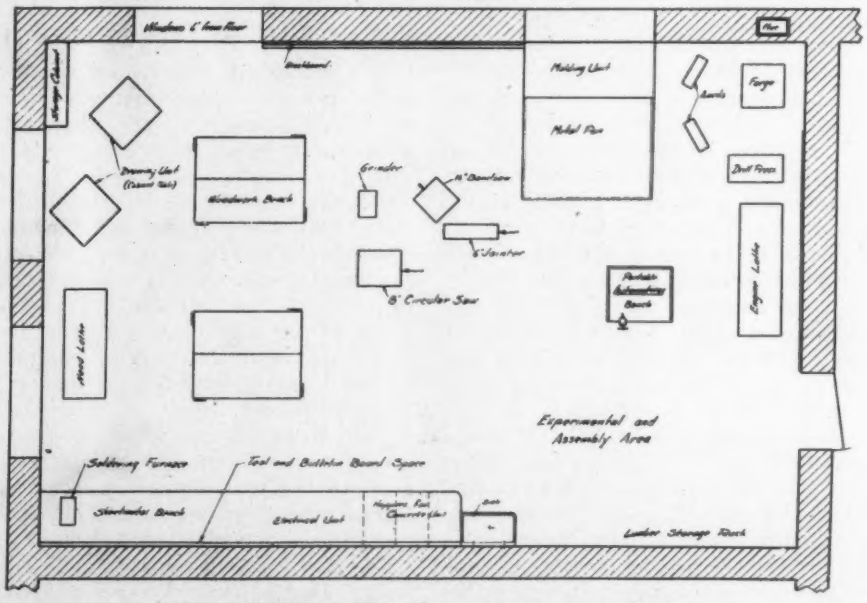
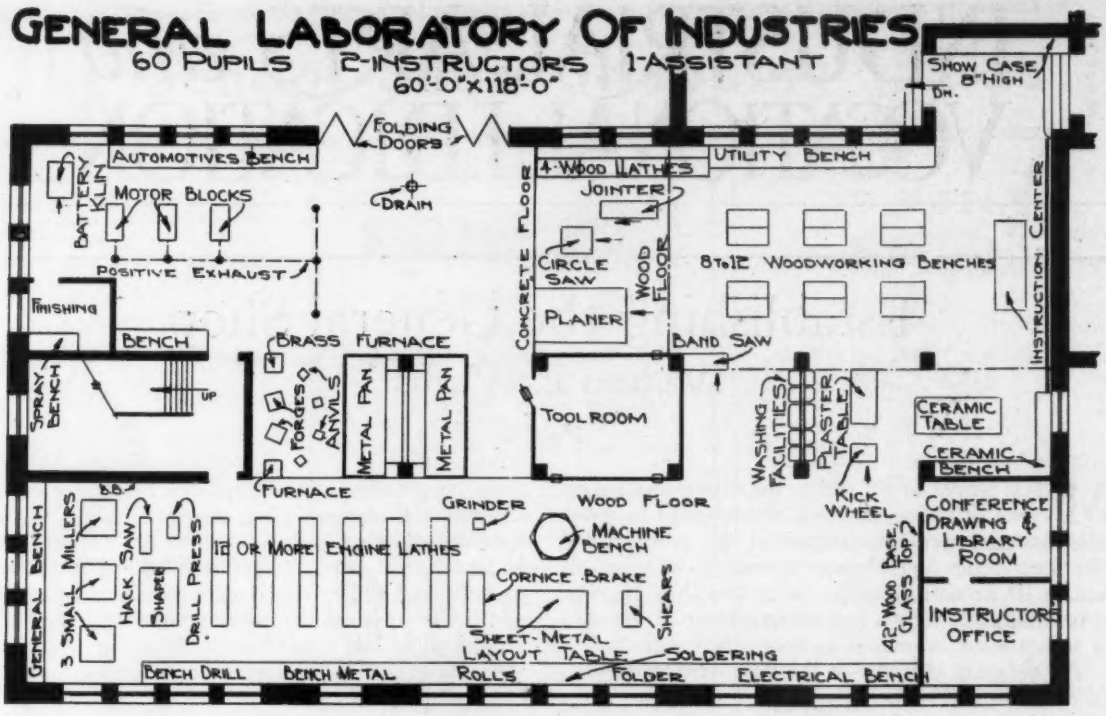


A SMALL GENERAL SHOP, 23 BY 35 FEET, 5 TO 18 PUPILS



central and more agreeable as well as a larger room is allocated. The general shop in this type of school is somewhat of a cross between the one just described for an elementary school and one which is about to be described for the junior high school.

General-shop work on senior-high-school levels usually divides itself into two classifications. One of these is a carryover of the plan conceived for the junior-high-school pupil where the youngster of senior-high-school age will merely continue the experiences that were had in the junior high school. A second classification of boys will include those started upon specific training programs for entrance into trade or industrial work. This latter group will be limited by the equipment of the general shop provided for any given situation. A "comprehensive" general-shop program like the one shown would likely permit the training of machinists, automotive mechanics, electricians, pattern-makers, and woodworkers. In certain sections of the country ship carpenters and textile workers may be given a rather complete program of training as the needs and opportunities for such work arise.

The general shop as it has been developed in certain of the part-time and vocational schools of the country has been found to be of unusual value for "vestibule" purposes. An application of this is seen in any one of several part-time and trade schools where an entering student is quite young and probably uncertain about the specific type of work he would like to do. This boy is immediately enrolled in a vestibule or general shop for "observation," tryout, and general exploration to see what he can and would like to do. It is a sound and effective plan as students normally entering at any time may be started in groups in later trade classes. Work of this sort is to be found under the head of many different names, but is essentially built around the same idea.

The general shop has also found its way into "teacher-training" institutions as might be expected. One of the reasons for the slow development of the whole general-shop idea has been the complaint that no one was able to teach such work. But, by the end of the current year nearly all of the larger universities, colleges, and institutes where shop teachers are prepared, will have included some sort of general-shop plant in their training curricula. Many of these schools do not agree on the purposes for such a shop. These are evidenced by the examples seen on every hand. Instances of general-shop work may be found in any one of the four academic years of college training.

The Purposes of the General Shop

It is conceivable that anyone would equip for general-shop work without making a careful study of its possibilities, functions, and shortcomings. General shops are springing up on every hand, many of them with little thought back of their establishment. People seem to be content with the generalizations and glibly stated truisms of purposes, and many of the objectives now held for general-shop work are equally vague to teachers and school officials because their relationship to practice is not well seen. An examination of some acceptable objectives may not be remiss at this point.

1. *Avocational Interests* oftentimes lead rather pointedly to the discovery of *aptitude traits* particularly in adolescent boys and girls. The general shop affords a splendid opportunity for the development of these interests. Such interests are not confined, however, to the general-shop environment alone, as a teacher soon learns to foster their establishment and growth using the school-shop situation as a center for wider interests than can be provided there.

2. *Consumer Knowledges and Appreciations for* industrial products is of significant importance to the

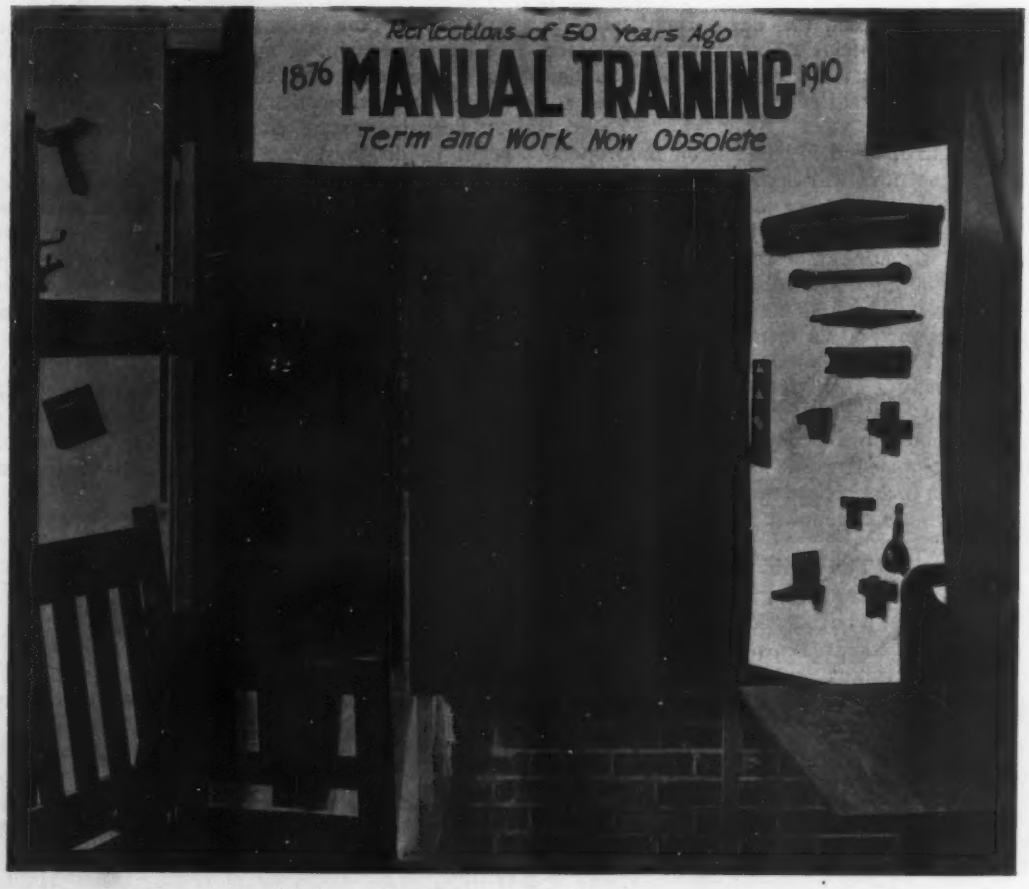
general shop's program. The educational principles of wisely *choosing* and *using* an ice box, automobile, vacuum cleaner, lawn mower, cedar chest, mohair davenport, tweed topcoat, silk socks, balanced meal, worth-while book, baseball bat, domestic rug, or any other one of many hundred articles seen today should be apparent. A study of the many aspects concerning the purchase and intelligent use of these *products of industry* can and should be developed daily through a properly taught general-shop course.

3. *Exploration* is a badly misused objective commonly mentioned as the most important of all for general-shop courses. School-shop work is too frequently confined to the *manipulation* of tools, machines, and materials in a narrow range of industrial representations. There is scant likelihood that "exploration" will be achieved in such a situation as effectively as would be possible in an actual industrial or trade environment. Resort to motion pictures, student investigations, excursions into industry, actual participation on a job for wages, studying about industry from specially selected literature, and inquiring into the romance of invention and inventors, must be made if the outcomes of educational exploration are to be achieved in any marked degree. Surely no shop teacher will think for a minute that he is achieving the exploration objective merely by equipping for two or more phases of shopwork and trusting to luck for "transfer" of appreciation to trades like baking and watch repairing. It is certain that the social and industrial atmosphere of production mingling with actual labor, competition, wages, seasonal uncertainty, and unusual machine specialization will never be experienced in an exploratory way within the walls of a school shop alone.

4. *Guidance* will function when exploration is properly conceived and developed, as the two objectives are mutually interactive. An instance of this is seen in a general-shop situation being taught by a professionally trained teacher who diagnoses his pupils from as many angles as possible for the purpose of helping them better to discover their interests and capacities for industrial work. Both exploration and guidance then go hand in hand. One helps to achieve the other, and the certain outcome of guidance may be determined by the simple expedient of checking up at five-year intervals on the "prognostications" held for individual pupils in times past.

5. *Specific Abilities*, largely of a "handy-man" nature, compose an objective typical of home-mechanics courses in many schools. This is a very specific and somewhat limited purpose and deals first of all with a careful job analysis of the things that *a boy should be able to do* about the home, in woodwork, in metal work, in general mechanics, and the like. Its sole emphasis is narrowing to the extent that other objectives and functions of general-shop work are likely to be ignored and that its operation is usually controlled by adult dictates.

6. *Social Habits and Attitudes* regarding the work of the general shop and industrial phases of life, are essential to promotion and happiness of individuals living in an industrial society. The latter part of Bon-



ser's definition of industrial arts, "Industrial arts as a study of the changes made by man in the forms of materials to increase their values, *and of the problems of life related to these changes*" is an example of the place and emphasis given to this phase of the general-shop experience. The plastic nature of an adolescent boy or girl as he or she is found in the general-shop situation, make the development of social growth possible in connection with any technical experience gained therein.

7. Snedden's *Developmental Concept* for industrial arts refers in part to the teachings of Dewey and others regarding the relationship between experience and growth. Youngsters learn best in situations that are real to them. The broad range of experiences made possible through a general-shop arrangement should normally make for a more effective development of young adolescents than that usually provided by a more specialized, nonvocational type of experience seen in the more obsolete forms of manual training. Any youngster who can develop the habit of inventiveness or creativeness and makes an effort to achieve his desire for such action, will grow in a freer and more natural manner than another youngster who must follow the dictates of some more practical man who foists the results of his trade analysis upon the boy when the youngster is in all probability not ready for such specialized training.

8. *Specific Vocational Training* should always be available to students who are either to drop out before completing high school, or who have chosen a specific occupation. The applications of this objective will vary as widely as individuals vary. Some will not come under its influences until they are well past 20 years of age. Others will be controlled by it before they are 5 years of age, as is seen in the case of the natural-born musical genius. Whatever single, or combination of industrial-arts objectives, apply in any specific teaching situation or to any individual pupil, it is assumed that a ninth and final objective will be of importance.

9. *Curricular Integration* is a broader notion of the older objective relating to "coördination" of school subjects. The idea of integration is broader than any statement of "subjects" as may be seen in the general shop's attempt to relate itself as closely as possible to the boy, to his life, to industry, as well as to the school. This constitutes integration.

(To be continued in an early issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION)

Conducting Special Manual-Training Classes

*Frederick R. Bolton**

THE following method was devised and put into practice in the special B boys' manual-training classes in Detroit and is adaptable to any manual-training class that is held every day in the week for an hour or more.

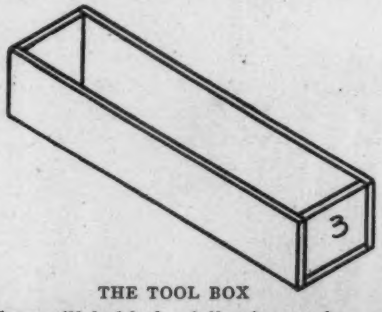
This system or method is based upon shop operations such as the boys will encounter when they go out into the world and secure jobs in factories. *Responsibility* is the *mainspring* of this plan of organization. Everyone is made responsible for his own tools, materials, and job, and the method operates through a system of student checking student, so that eventually with the instructor as a mere superintendent, the class goes ahead with its work like a smoothly oiled machine, with only a slight hitch here and there for the instructor to straighten out. This leaves the instructor with more time to devote to retarded cases and special development work.

The boys seem to appreciate responsibility and some surprising results are accomplished under this system.

The Crib

The first step in organizing a class under this system is the building of a crib or room in which all tools and supplies must be kept. When tools and materials are handled indiscriminately they soon disappear. Then, too, handling tools in this way does not represent a life situation, hence there are two good reasons for safeguarding them in the classroom.

There are two kinds of tools used in a manual-training shop. There are the bench tools of which we have one for each bench and the general tools of which we have one, two, or more for the use of the entire class. The bench tools have usually been kept on the benches, or in the bench drawers. If the instructor does not keep a constant check on these tools they soon begin to disappear, or trouble is experienced with breakage, accompanied by the corresponding difficulty of tracing the responsibility. The instructor of necessity must go over every bench or drawer with minutest scrutiny. In a factory or shop every job that requires any amount of tools has a tool box provided for it, which the men who perform the job check in and out of the department tool crib. Therefore this idea was incorporated into the system and some boxes were built, one for each bench and numbered accordingly. These boxes were made so that the five bench tools in our shops would just fit in snugly and visibly, a most important point. A sketch of the box follows.



THE TOOL BOX

This box will hold the following tools snugly: One No. 5 Bailey jack plane, one hack saw, one rule, one 6-in. try-square, one bench brush.

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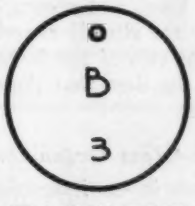
Each of these tools is numbered the same as the bench and the box to which they belong. This can be done with steel stamps, or by etching, and it eliminates the switching of tools when one is broken. Each box is checked by the crib boy when handed in, and further checked by the boy in the next class when he takes the box out. He is compelled to do this by the establishment of the rule that if any defect is not reported immediately by the boy upon taking out the box, he becomes responsible for it and will have to make settlement. The tools fit into this box in just one certain way, and characteristics of proper habit formation are developed by insistance that these boxes always be put away in order. This can also be enforced by the double checking system which the boys carry out.

The plane irons should be removed from the plane in these boxes and separate plane irons furnished for each boy in each class. Boxes should be built, one for each class to hold as many plane irons as there are benches. The spaces for these plane irons should be numbered to correspond with the respective benches, and the plane irons themselves should be marked or stamped with the class letter or number and the bench number. Thus, the number on the plane iron will correspond with the boy's check number. He is held responsible for the condition of this most necessary part of his equipment and his alibi that someone else in another class nicked or dulled his plane is gone forever. By imposing a slight fine when plane irons are nicked, trouble from this source almost entirely disappears and dull irons will be the only ones that will have to be sharpened.

The next development was that of checking up on the general tools. Under the old system, where everybody helped themselves, there was merely the instructor's check at the end of the hour to see that all tools were in. If any were broken or damaged it was next to impossible to place the responsibility, and naturally under this system plenty of these instances occurred. To do away with this, round brass disks about one inch in diameter, having a 1/16-in. hole punched through them close to the edge to hang them up by, were



THE TOOL CHECK

secured for each bench, and for every class. These checks bear the number or letter of the particular class at the top and the bench number at the bottom.

The accompanying illustration shows the check of the boy in the "B" class assigned to bench No. 3.

A board was placed in the crib with enough No. 114 screw hooks screwed into it to carry all of the checks for all of the classes. At the top of the board appear the letters or numbers of the various classes and under each letter or number are arranged a group of hooks, one for each bench in the shop with the corresponding number of the bench under the hook. On each hook are three similarly stamped checks. When a class comes into the shop the first duty of every boy is to secure his checks. Without checks it is impossible for him to get any general tools out of the crib. He must give a check for every tool he takes out of the crib, except his box of tools and plane iron, which are numbered and charged against him as a matter of course. A benefit derived from the use of this check board by the instructor was secured by taking up a chart to hang up at the side of the instructor's desk. Upon this chart are outlined the benches of the shop with their corresponding numbers, one set for each class, with sufficient space to write or print in the name of the boy assigned to the particular bench in the particular class. As soon as the class have all secured their checks, the instructor has merely to look at the check board, see which checks are still on the board, compare with his chart and he has a rapid-fire attendance record.

Another board called a tool board was made, which has a number of rows of nails (brads) or No. 114 screw hooks. Over these hooks appear the names of the various general tools kept in the crib. When one of these tools is taken out from the crib, the boy taking it gives the crib boy one of his checks, and this check is hung up on the hook under the name of the tool. The crib boys soon become very familiar with the names of each and every tool. Nomenclature has always been a source of trouble in all shops, school and otherwise. It has been the rule rather than the exception to call tools by the first name that enters the mind, such terms as gaget, thingamajig, whatdoyoucallit, etc., being familiar sounds in all shops. Here we get a chance to stress proper habit formation, that of calling articles by their proper and accepted name. Therefore, we instruct the crib boys not to issue a tool to anyone unless asked for by proper name. A chart carrying the picture of every tool in the shop with its proper name directly over it is hung up near the crib window and the boy is compelled to look for the picture of the tool that he wants and get its name therefrom if he does not already know it. The result is that after several trips to the chart, he makes up his mind to learn the various names of the tools, and proper nomenclature becomes the rule rather than the exception. From the tool board we can always tell where every tool is and we do not allow switching of tools out in the class. If a boy is through with a tool he must return it to the crib and get his check back. If another boy wishes this tool, he must go to the crib and check it out. This places the responsibility where it belongs and destroys all alibis as to loss, damage, etc., and consequently eliminates loss or damage almost entirely.

We found by experiment that three checks for each boy was the best number, because it is very seldom that a boy needs more than three general tools out at one time, and three is an easy number for the crib boys to check up when all the checks are handed in at the end of the class period. We have provided for the contingency, where a boy does need more checks by having five extra sets of five checks each on the check board. These extra sets are numbered one, two, three, four, and five hundred. When the boy needs extra checks, he signs his name on a slip of paper and receives a set of five extra checks, this slip being hung upon the hook from which the checks are taken. When the checks are returned, the slip is torn up.

The duties of crib boys are too numerous and the responsibility too great to train every boy for the job. In fact, in our work in special education with the subnormal, we found that it is the kind of work that our higher type fitted into rather well, but which our lower type were absolutely unfitted for. We also found that the responsibility was best placed by not too frequent changes in crib boys. The best solution was found in developing a gang of five boys, one of whom acts as head crib boy or crib foreman as we call him one day per week. As crib foreman, he spends the entire day in the crib and is absolutely responsible for everything concerning it on that day. He has a helper to aid him at the times when class changes are made. This helper is usually one of the gang of five and who will act as foreman on another day. The helper is responsible to the foreman and it is the foreman's responsibility to see that his helper is on the job at proper times and that his work is properly done and checked up. Thus, these boys have the opportunity to both give and take orders during the week. This brings about a balance and eliminates any chance of cockiness on the part of any one of the boys. The foreman does not lose as much academic work as it would seem at first thought by keeping him in the crib all day. He would be in the shop a third of the day at any rate, so that his net loss of academic work is little more than one-half day per week and this is amply compensated for by the special training he receives in responsibility and habit formation. His watchword becomes "A place for everything and everything in place."

A piece of equipment that we built and placed in the crib is a rack made of a piece of 2 by 2-in. lumber, 40 in. long drilled with three sets of ¼-in. holes, 1½ in. deep. There are fifteen holes to the set, one hole for each bench in each class. In these holes we place pencils numbered with steel stamps (which are part of our crib equipment) to correspond with the numbers on the boy's tool checks. These pencils must all be turned in at the end of the class period and it is one of the crib foreman's many jobs to see that they are. Thus, we eliminate the boy's alibi for idleness that he forgot or does not have a pencil, or his excuse to go back to his room or locker to get one.

Our crib organization is maintained by posting a schedule, one in the crib and another in the homeroom, showing who the crib foreman is and also the helper (as his assistant is called) for each school day of the week. Below the names appear notes stating that the foreman is to stay in the crib the entire day, and also the times when the helper is to be on duty. Thus, the boys have no chance to alibi that "they didn't know" or "they forgot." We found a genuine interest exhibited by the boys after this schedule was posted and that they were on the job 98 per cent of the time, or else made arrangements with one of the other members of the gang to exchange days when they found out that they might be absent from school on their day in the crib. We have heard boys say that they would not have come to school on a particular day, but for the fact that it was their day in the crib and that it would make too much trouble for everyone for them to stay out.

THE SHOP CLASS IN SESSION

When we want to break new boys into the gang we start them out as helpers sometimes ahead of the time that we will need them as foremen, so that they will be well trained by the already experienced boys. This also relieves one or two of the foremen from serving as helpers during the time that these new helpers receive their training.

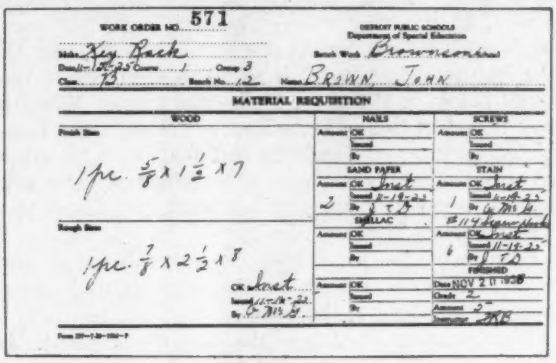
The Class Organization

When boys work in an industrial shop, they are fitted into a typical organization. Their immediate superiors are the straw bosses and foremen, all of whom work under another head, usually called the superintendent. This organization was adapted to our shop by having the instructor fit in as superintendent, and drawing upon the class itself for the foreman and assistant foreman. The two best workers in each class are chosen to fill these positions. They get the class started, get out lumber for the boys to work with and check the work of the other boys. That this can be done has been absolutely demonstrated in our classes. If there is any difference between this system and the old, it will be found that the boys run a closer check on the work of their classmates than does the instructor. Thus, the instructor merely acts as a court of

appeal and has more time to devote to particularly slow cases, or to appeal to the development of new ideas.

We found that with the exception of our lowest-type boys, which we call our C class, we are able to secure foremen from the classes themselves. With our C class we usually find one boy who can serve as an assistant foreman, but it is necessary to select students of our higher classes (the A and B classes) to serve as foremen of the C classes. These foremen are alternated each day. The assistant foreman being on the job every day serves to coördinate their work. A schedule to this effect is posted along with the crib schedule in both the shop and home room, and is carried out and followed by the boys very closely.

In a regular shop, every nonproductive job given



THE WORK ORDER

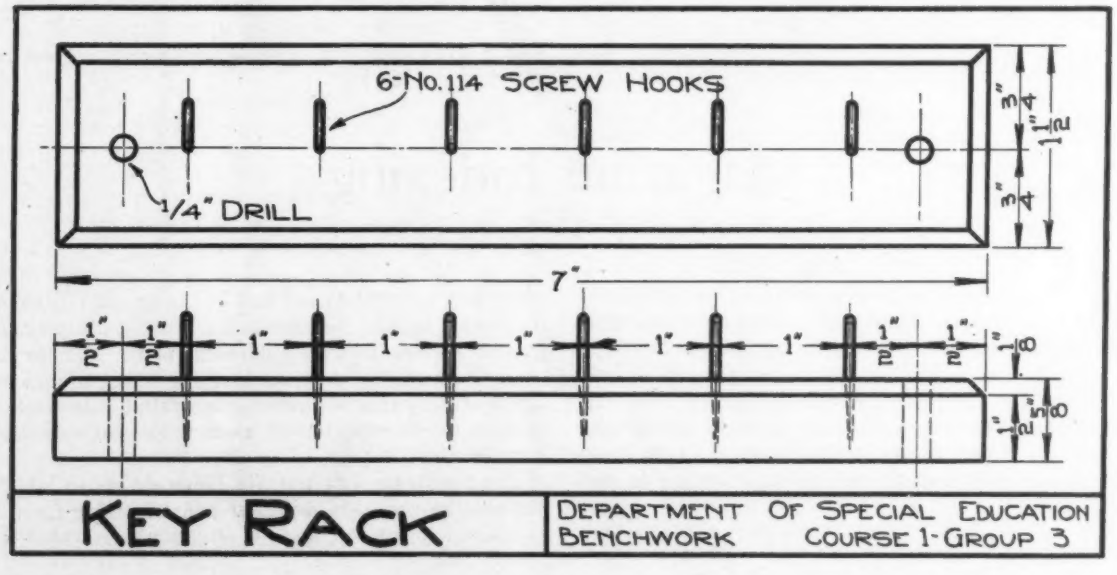
out to a man is accompanied by a *work order* which carries a number. Any material that the man may need, he requisitions out of stock on a blank and charges it against his particular work-order number. When the job is completed, these requisitions are attached to the work order and turned in to the cost department of the shop or plant. This idea was put into operation in our shop by incorporating a work order and a material requisition into one 5 by 8-in. blank which is illustrated below.

As a boy starts a new model in a particular group, one of these work orders is issued to him with a number on it. The number series starts at the beginning of the year from some number arbitrarily taken, so that the same numbers will not be used two years in succession. The boy takes the blue print of his job and from it gets most of the information necessary to fill in the work order properly. The foregoing order was made out for the key rack shown in the illustration, of which a blue print accompanies the order.

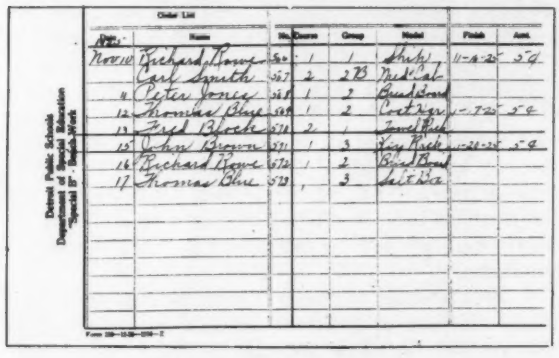
It will be observed that the name of the project, the course and group number appear on the blue print so that the boy can fill in these blanks on his work order as well as obtain the conventional information in regard to size, kind, and amount of material necessary to complete the job. He first gets the finished size of his wood and then adds the standard allowance of the shop to get his rough sizes. He estimates the amount of sandpaper he will need on this job, ascertains the number of screw hooks specified on the blue print and determines whether the job should be stained, painted, or shellacked. Spaces are provided under the requisition part of the work order for most of the materials used by the boy and he writes in his estimate under the word *amount* in the proper space. When material is needed that has no space provided for it on the requisition, as for example, the screw hooks in the order shown herewith, the item may be written in a blank space or over the printing in an unused space as shown. When the boy has done all of this, he presents it to the instructor for an O.K. of the various requisitions. If a foreman has been on the job for some time, it will be found that he can be permitted to O.K. these requisitions.

When the order has been O.K'd, the boy presents it to the foreman or assistant foreman, either of whom will get out his wood for him in rough sizes. They then sign the wood requisition opposite the word "Issued" and stamp in the date in the space provided. This prevents the boy from repeating on taking out wood on the same job in case he spoils that which he already has. The only way that he can get more material than was originally requisitioned and O.K'd is to see the instructor, explain why he should obtain more, and get a new requisition indorsed on the back of the order, bearing the instructor's O.K.

The boy can get any part or all of his material out



at any time by presenting his order at the tool crib where the supplies are kept. He soon learns, however, by experience that there is a proper time to take out his material and that that time is when he is ready to use it. If he takes it out before he is ready to use it he has the burden of safekeeping it, whereas if he leaves it in the crib he has none of these difficulties. When supplies are issued at the crib, the crib foreman dates and signs the requisition in the spaces provided and this prevents repetition of requests for material. Since using this system we have eliminated the situation of boys with their pockets full of nails, screws, etc., which we formerly ran across every little while and we have actually cut the quantity of material used by 40 per cent. The boys also become more careful with the material, that is, they use it up and try not to spoil any, for they know that they will have to make an explanation to get more, and they find that it is really easier to be careful. Here we again make a strong drive for proper habit formation.



THE ORDER RECORD LIST

When the boy completes his job he hands it in to the crib boy who stamps the work order number on the back or bottom of the model with the steel stamps. For example, when the key rack made on the foregoing order was turned in, the number 571 was stamped into the wood on the back. This forever identifies it as the work of John Brown. The crib boy then stamps the date in the blank provided in the lower right-hand corner of the work order under the word *finished*. He then puts the order on a hook or in a certain drawer of the instructor's desk and the project on a shelf provided for newly finished work. When the instructor has an opportunity he takes all these newly finished jobs and work orders, grades the work and marks the grades upon the corresponding work order in the space provided in the lower right-hand corner, looks over the material used, spoiled, etc., and then marks down the amount the boy will be charged (provided that they are charged for material used) in the proper space and signs and files the work order and puts the project on a shelf designed for the work that is ready to be taken home.

These work orders are filed in a loose-leaf binder 3 in. thick. It was found that this kind of binder was about the right size to accommodate all the orders of a class of 45 to 50 boys. They are filed alphabetically according to the boy's last name, a section being provided for each boy by using heavy brown-paper indexes or dividers, cut and punched to the size of the work orders. In this way a very complete record of each boy's work is kept, practically by the boy himself. All the instructor has to do, is to fill in the items in the small blank in the lower right-hand corner. When a boy transfers to another school or center, these completed work orders should be sent along with his other records, so that his new manual-training instructor will have a complete history of his work and know just where to start him.

The instructor must keep one other blank in the front of his loose-leaf binder, the following illustration being an example of the same.

This blank is filled in at the time that the order is given out and also serves as a progress chart of the entire group as the date under *finished* is not filled in until the job has been finished and graded and the work order filed away. Thus, by referring to these blanks in the front of the book it is easy for the instructor to determine the jobs that are not completed, how long a boy has been on a job, whether he is falling behind, etc. These blanks are of great value to the instructor in keeping in touch with retarded cases.

The orders are kept in folders, a separate one for each class, and it is the duty of the class foreman to get these out of the crib, see that each boy has his order before he starts to work and that they are handed in again. It is required in our shop that each boy keep his work order and his blue print on his bench in one place so that the instructor, principal, supervisor, or substitute can go about the shop and see at a glance what each boy is doing and what progress he has made on his job.

Magazine Indexing

*George T. Jackson**

MANY teaching aids appear annually in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION and other magazines, which could be used throughout the year if the instructor had plans made up of desired projects. The instructor, however, usually does not have enough time to do all of this himself, nor does he like to cut a page from a magazine as it may destroy the value of another article on the reverse side and when pages are taken out and left loose, they become dirty, torn, or lost. To solve this difficulty, the projects should be indexed in alphabetical order, and, to be of further aid, the projects made of metal should be alphabetically indexed under a separate file for metal, another for woodwork, still another for machine shop and electrical, etc.

The instructor can use his judgment as to which material he considers practical and adaptable for the

*Orange, New Jersey.

particular grade when he is indexing. Cards can be added to the particular files as new magazines are received.

If a boy wishes to make a magazine basket of wood, he is told to go to the woodworking file and look up magazine baskets. Below is a sample of an index card he may find. In a moment he knows in which magazine he can locate plans for this project.

The magazines should be arranged on shelves or racks so all the magazines will not have to be handled. It may be well to place magazines, regardless of year of publication, together. The shelf could be divided into sections representing each month of the year with the label of the month affixed thereon. The boy would then have only several magazine covers to look over to find the year indicated on the card. He can likewise refer to any publication which has magazine-basket plans as per index card in the file.

Magazine	Date	Page	Remarks
Ind. Arts	Jan 1928	97	v. good - Grade 8.
" Educ.	Mar. '26	34	fair - Grade 9.
" Arts	Oct. '30	56	good - Grade 8.
" "	Dec. '27	115	good - Grade 8.
" Educ.	Apr. '30	76	fair - Grade 9.
" "	Feb. '30	81	v. good - Grade 8.

INDEX CARD

Student's Job Record

*Edward Stein**

IN teaching the boy the use of tools, machines, and equipment, it is necessary to make sure that he is acquainted with the names of all the things he has used in making each project.

The card system described herewith helps to check up on this question, and has been productive of good results. The cards also are useful as a factor in character development, because they help the boy to form correct ideas about his own capacity and ability. Each student is required to mark his own job. He is given the opportunity of making his own decisions, although the teacher assists him in his decisions at the beginning.

The accompanying illustrations show the face and reverse sides of the card. The face of the card is filled out entirely by the student. When he starts a job he fills in the name of the shop, his own name, classroom teacher's name, age, name of job, and the date of starting. The card is then placed in a box marked "unfinished jobs" and kept there until the article is finished.

When a job is completed a mark for the successful completion of the operations involved is given on a progress chart. The boy fills out the balance of the card — the date when the job is finished, the tools and machines used, materials and operations involved in the making of the job, and what he has learned. The card is then brought to the instructor for his O.K. and signature.

On the reverse side of the card the instructor marks progress made or lost in the various character traits indicated. The fact that the cards are continuously before the class stimulates each student to strive to do better.

This card system teaches the boy how to keep a record, gives him additional practice in spelling, writing, and neatness, and is an aid in helping him to establish the right habits. He is taught also, that the time elements plays an important part in the finishing of a job, and that proper habits and good character are as necessary as good tools in the production of a good job.

*Adjustment School No. 50, Buffalo, New York.

STUDENT'S JOB RECORD ..... *SHOP*

Name ..... Class-room ..... Age .....

Job ..... Started ..... Finished .....

Mark this job yourself, Fair ..... Good ..... V. Good ..... Excellent .....

TOOLS	MACHINES	MATERIALS	OPERATIONS

What did you learn from this job? .....

.....

.....

Instructor's Signature .....

GENERAL REMARKS

"*I*" Denotes improvement in habits given below.

"*F*" Denotes falling off in habits given below.

Accuracy	Judgment	Quality of work .....
Neatness	Self help	Care of equipment ...
Cleanliness	Perseverance	Capacity to take responsibility ....
Interest	Self control	
Initiative	Originality	Respect for rights of others .....
Economy	Industry	
Courtesy	Loyalty	
Honesty	Courage	

Remarks .....

.....

.....

.....

FACE AND REVERSE SIDE OF THE JOB RECORD CARD

CHOOSING EARLY

We should encourage the choice of a vocation at the earliest possible opportunity; any other course will only widen the gap between school and real life. — *L. S. Harding.*

LEARNING BY DOING

We have come to see that education consists in doing things. In more general terms, we define education as preparation for participation in life's activities and the ability to meet the demand that society places upon the individual. — *C. F. Klinefelter.*

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

PROFITLESS ACTIVITY

One frequently hears of industrial establishments that are extremely busy. Huge orders are handled, large amounts of material are worked up, and armies of employees are kept busy. Yet frequently, at the end of the year, the results are not commensurate with the activity that has produced them. In business parlance this is frequently referred to as profitless prosperity. In some school shops similar conditions are apparent. There is great activity, the teacher is working, the students seem to be interested, and according to all indications they are deriving a great deal of skill. Closer scrutiny of the method of instruction prevailing in the shop may show that while certain benefits are derived by the students, yet major considerations are overlooked.

The shop teacher must not forget that besides teaching a subject, he must also have in mind that characters must be formed. The teacher who is interested only in transmitting information and skill, is overlooking the main part of his job. Just as there may be profitless prosperity in business and industry, just so there may be profitless activity in the school shop, unless the increase in skill also shows an increase in character development of the right kind.

With the shop subject must go opportunities which permit the boy to acquire habits of industry, the right ideas about teamwork, the proper conception of the interdependence of the individual on those with whom he comes in contact. There must be a realization of what the student's duties are to himself, to his family, to the community in which he lives, and to the nation at large. Some conception of how the school, the church, and society functions in ones life must be had, and what one must do in return for the benefits that are conferred on the individual by these institutions. It is only when the shop teacher and, in fact, any teacher realizes that the expansion of the student in all of these directions are part of his concern, that the work in any particular class may be said to be truly educational, and that the results obtained in such a class can be more than merely profitless activity.

—⁂—

SIZE OF CLASSES AND ORGANIZATION OF INSTRUCTIONAL MATERIAL

In the minutes of the board of public education, Pittsburgh, Pennsylvania, of April 22, 1930, appears a memorandum to the superintendent of schools, suggesting factors entering into the problem of establishing a policy governing the administration of the trade schools. In this memorandum the question of size of shop classes is touched upon in the following manner:

"Size of classes. It has been our policy to maintain a pupil load of 25 pupils to a teacher. It should be said that this number is greatly in excess of that maintained in most state and federal aided vocational schools and somewhat in excess of any other trade school of which we have any knowledge."

While the foregoing statement is especially concerned with Smith-Hughes classes, nevertheless it is of great interest to everyone connected with any portion of industrial-arts or vocational-education work. The supervisor who is anxious to do a good job receives very little help from a study of the statistics furnished by many cities in regard to the size of the classes which he is to inaugurate in his own school. In some cities the shop teacher load is as low as 15, while in others it runs up to 35 and 40. The teacher who has been accustomed to a shop load of 15 will at once say that a class of 35 cannot be handled properly by one man; while the teacher in the cities where the size of the population makes it imperative that the shop load should be as high as 35 must find ways and means of accomplishing the task imposed upon him if he wants to retain his position.

Just what the proper size of class for the shop teacher should be, has not yet been definitely determined. It would seem, however, that the time is ripe for serious studies of this question. Needless to say, such a study should be made only under actual class conditions. This can the more easily be accomplished now that good objective tests for shopwork are becoming more numerous every day.

The question of class size has been quite scientifically determined for academic classes. It must be determined for shop classes in the same way before we can definitely decide that one class is too small or another too large.

This same memorandum makes the following suggestions about the organization of instructional material:

"Organization of courses of instruction. The courses of instruction offered have been determined by the need of the industry for better-trained young workers, the value of the industry to society, the opportunity for advancement, the teaching content possible in the industry, and, particularly, the coöperation of the employers in the industry and their request for the maintenance of training courses in their respective industries. Such courses have been organized with due reference to the practical demands of the industry and, in most instances, with the active coöperation of the industry in question.

"Particularly, it has been our policy not to train more boys for a given industry than the industry can be expected to absorb. In other words, the number of classes organized in any one subject has depended upon the number of workers employed in that industry or related industries in the Pittsburgh district."

The suggestion contained in this section of the memorandum is thoroughly in line with up-to-date methods of analyzing what should be included in the outline of instruction. To determine what should be taught to the learner in this manner is thoroughly scientific because it studies the problem from the right angle. A course of study established in this way will not contain material that is merely good to know, but it will be replete with subject matter that must be known. In other words, the student will spend his time in acquiring the things which he can actually use when he

enters industry, and the only way in which to discover what industry needs is by studying industry itself.

Then too, the adoption by the school of the policy of training only sufficient students in a given trade to supply the requirements of that trade, is to be encouraged. The pursuance of this policy, permits of the setting up of rigid requirements for entry into a given trade class. Secondly, it allows of the setting up of high standards of accomplishment, and thirdly it eliminates a great amount of ill feeling which results when students are allowed to spend from two to four years preparing for an opportunity which they may find at the completion of their training, does not exist.

There are numerous courses offered in trade schools that are exceedingly tempting and interesting to the average boy. Take, for instance, electricity with its promise of interesting experimentation. This study has an appeal to the majority of boys which can hardly be resisted. However, little can be gained by training large numbers of boys for the electrical field when that field can absorb only a limited number. The same, of course, is true of other fields as well.

The shop teacher should not fail to impress on his students that a boy who can become a good woodworker can, by application, become an equally good metal worker; that life need not necessarily be a drab and dull existance to the man who becomes a plumber even though his life ambition was to become a good electrician. Boys must learn that life requires certain things from the worker and that, above all, man must be adaptable.

Because one trade or group of trades becomes superannuated is no reason why the workers in that trade should not apply the skill which they have acquired in some other trade. They cannot merely stop working and depend on the rest of the world to support them. Life is that way. It requires adaptation and the men who suddenly find themselves without a trade must simply apply themselves to other work, probably less attractive than their first choice, or starve. It is well for the student to learn early in life that while it is advisable to consult individual inclinations, nevertheless the main thing is to be prepared to offer services that are in demand.

VOCATIONAL EXPANSION — WISE AND UNWISE

In the realm of vocational training, the same as in all other branches of education, there are those who not only manifest distinctive leadership, but also those who demonstrate originality as well as exceptional force and virility. Such men have their value. Their efforts are characteristic of the American spirit of progress, which strives to excel and do things different and better today than they were done yesterday.

The urge toward expansion and elaboration which leads to finer and more utilitarian things is laudable. It spells progress, and from that standpoint is both desirable and commendable. It also constitutes one of the finest traits of the modern teacher.

But expansion as applied to the modern system of popular education has its limitations. At any rate, it is subject to conditions and considerations which cannot in the nature of things be wholly ignored. And what applies to the scope of popular education applies in a similar degree to vocational training.

The ambition to excel, to strive for originality and sweeping departures, or do things different than they have heretofore been done, may, however, lead to the inconsistent and indefensible.

Thus we encounter the vocational leader who is inclined to set up educational values which are attractive theoretically, but which do not square themselves with the practical needs of the day. He may become so deeply engrossed in the intricacies of his calling as to lose his own perspective and the relation which vocational training bears to the general scheme of things.

It would seem quite superfluous to reiterate the fact that any system of vocational education which sets out to perform a maximum service must perform that service in the light of the vocational needs of the community. The industrial and commercial areas require vocational recruiting. Such recruiting must not only be consistent, but it must be regulated as to volume as well as the kind of service the industries can probably absorb.

Where vocational training encounters criticism, it is because the expansion idea is being unwisely fostered. Sometimes it takes the form of an unbalanced trade training, or else a wasteful expenditure in equipment. Not infrequently, the vocational-training leaders of certain cities are subject to sharp criticisms because they proposed innovations which involved heavy expenditures without promising a compensatory service. On the other hand, vocational schools have won special public praise in instances where they have met the local industrial needs with exceptional readiness and completeness.

It is not the purpose here to point out what makes for either the popularity or unpopularity of vocational training, but rather to point out some of the things that may hamper the orderly development of the same. If vocational training is to realize all its finer and higher possibilities it must progress along judicious and reasonable lines. Every community has its own needs which must be met. The mere desire of the instructor to manifest originality has no value unless it finds expression in a new service, or rather in departures that will strengthen the productive ability and skill of the worker.

It may be held that vocational training, on the whole, is safely established and therefore not likely to suffer any setbacks, but if vocational training is to come into its own it must also enjoy the confidence and good will of the general public. Consequently, all departures and innovations, in the direction of an enlarged service, must bear in mind the limitations which financial considerations dictate, and which good judgment imposes. There must be a sharp line between wise and unwise expansion of the vocational service.

MERIT

There is but one straight road to success, and that is merit. The man who is successful is the man who is useful. Capacity never lacks opportunity. It cannot remain undiscovered, because it is sought by too many anxious to use it. — *Bourke Cockran.*

Helpful Suggestions for School Printshops

*W. Harry Phipps**

THERE probably is no elementary, junior-high-school, or high-school printing teacher who is not confronted at times with student-cheating, trickery, carelessness, negligence, or laziness in some form or other. Some of the numerous troubles are trading and stealing of jobs, dirty distributing, handfuls of type thrown into wrong cases or in any convenient corner, and neglect of shop duties in general.

The following explains a checking system that clears up these difficulties, and speeds up classwork.

A majority of the disagreeable problems arise from faulty distribution of type. The distributor, Figure 1, is a California job case, so arranged as to prevent dirty distribution. With the aid of this device the instructor is able to check over each pupil's distribution, and because only the type that has been just distributed is visible, it is easily seen at one glance whether the complete job is there and whether the right characters are in their places. The students quickly realize this and take pains in distributing to do the work correctly. After the instructor has checked the job and found it O.K., he checks the distribution on the job sheet, which is then placed on file for credit. Then the distributor is placed on top of the right job case and the instructor inserts the key and lets the types fall into their proper places. In this way the job cases are always clean. The distributor eliminates all the unfairness of showing up the good pupil by the dirty distribution of the pupil who does not know his case. The task of frequent cleaning of pied cases is also eliminated, as is also the temptation to cheat. The instructor may not find it necessary to have each pupil use the distributor continually. After a bright and industrious lad learns well the type and their places, he can be trusted to put his job directly back into his own case. This sets a goal for the rest to work for. They seem to take pride in being able to put back the type without the aid of the distributor. And, as the class advances, the boy is "kidded" by his classmates for having to use the distributor. This encourages the ones distributing directly in their job cases (for the instructor always glances over every boy's case after he has finished his work) to do clean work.

The best part about the distributor is that it is easily made. All the material needed is a California job case (or whatever style case that is used in the printshop), a 3-ply basswood board ¼ by 31½ by 13¾ in., a few small pieces of ¾-in. stock, a handful of wood screws and nails, and the use of a few tools. First measure off on the inside bottom of the character boxes, ⅞ in. from the front drawer guide lines for cutting out a portion of the bottom so the types may drop through. Take the ¾-in. stock, cut three pieces 15½ in. long (the width of the job cases). Rip one into two pieces lengthwise, and cut grooves in the other two. These are used for guides which hold the sliding bottom in place. The ¼-in. 3-ply board is used for the sliding bottom. It should be narrower than the job-case bottom, so as to have about 1-in. play when moved back and forth under the job case. This movable bottom is held in place in the

*Instructor of Printing, Chancellor Avenue Junior High School, Irvington, New Jersey.

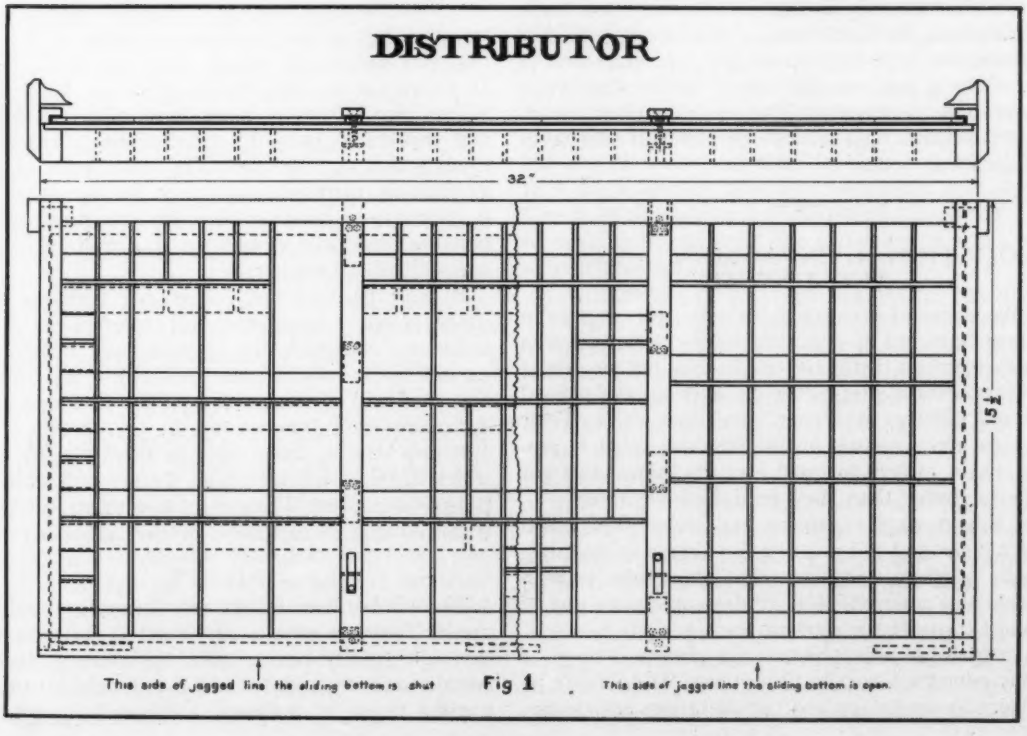
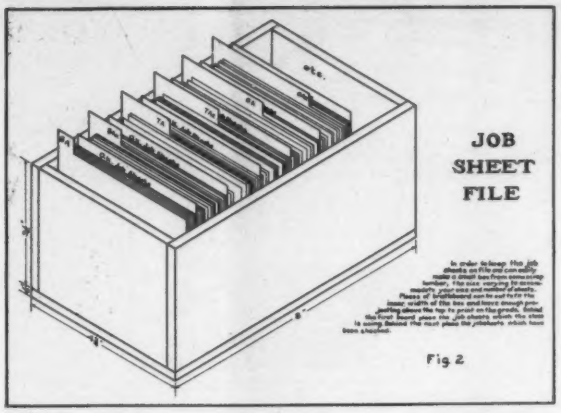
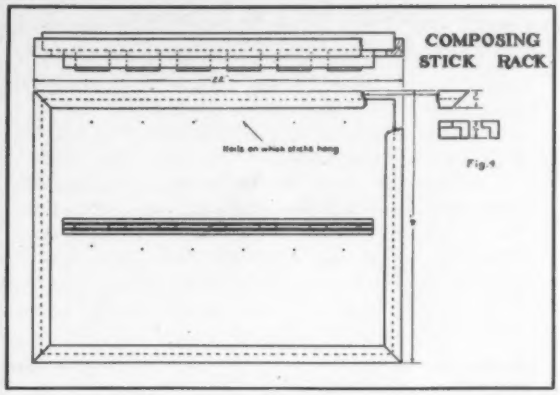

DISTRIBUTOR
32"
15½"
This side of jagged line the sliding bottom is shut
This side of jagged line the sliding bottom is open.

Fig 1

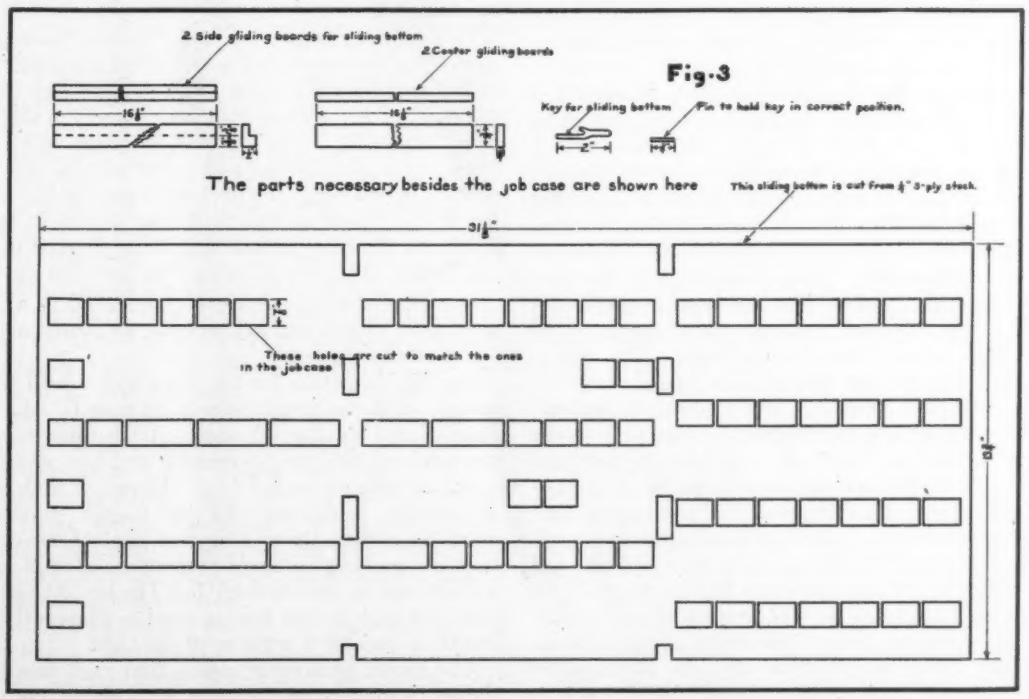




position it would occupy when the distributor is open and the holes which have been cut in the character boxes are marked or laid out on it. Then these holes, which correspond to the ones in the job case, are cut out. The movable bottom is next fitted in place and the guides are nailed or screwed fast. The movable bottom can now be moved back and forth. When it is at the back, the holes of both bottoms match. The boxes then are open for the types of fall through. Figure A shows the distributor from the bottom side. It is in the open position, that is, the sliding bottom is at the back. In Figure E the distributor is shown open, looking at it from the top. When the movable bottom is slid to the front, as shown in Figure D, the boxes are shut and will hold type. Small blocks of wood are nailed on the sides and back, which hold the distributor in place on the job case for the job to be dumped. Figures B and C show different views of the distributor in position on the job case. A slot can be cut through one of the center pieces of the frame of the distributor and into the sliding bottom. Through this slot a key can be placed to open and shut the distributor. Probably an easier method for opening it is to bend a hook on the end of a stout piece of wire and use this hook to open the distributor by catching it on the edge of one of the holes and pushing or pulling the bottom open.

Another helpful aid to the teacher is the job sheet, Sample A, which keeps full account of all the boy is doing, also with what type he is working. Every job has to be composed and distributed in good order before it is checked O.K., and a boy gets credit only if these O.K.'s are duly credited on this job sheet. Figure 2 shows how these job sheets can be easily kept on file.

Instructors often find trouble with boys leaving their work in the composing sticks and then hiding the stick in a convenient nook. The composing-stick rack, Figures 4 and H, takes care of this problem, while the tool rack shown in Figures F and G, takes care of the ordinary printshop tools in the same manner. The picture of each tool is painted in white paint on this tool rack. The instructor therefore, can see at a glance from anywhere in the shop if all tools are in place. These


2 Side gliding boards for sliding bottom
2 Center gliding boards
Fig. 3
Key for sliding bottom
Pin to hold key in correct position.
The parts necessary besides the job case are shown here
This sliding bottom is cut from ¼" 3-ply stock.
These holes are cut to match the ones in the jobcase

Chancellor Ave. J. H. S. Printshop
Job Sheet

Name .....
Grade ..... Job No. .....
Type Size ..... Style .....
No. of Case ..... Checked by .....
Type Size ..... Style .....
No. of Case ..... Checked by .....
Type Size ..... Style .....
No. of Case ..... Checked by .....
Proof O.K. ..... Distribution O.K. .....
Distribution O.K. ..... Distribution O.K. .....
Time of beginning Job – M..... D..... Y.....
Time Job is Complete – M..... D..... Y.....

Sample A

Chancellor Ave. Printshop
Name Card

Name .....
Grade .....
.....

Sample B

Chancellor Ave. J. H. S. Printshop
Record Sheet

Name ..... Grade
Jobs done for month of ..... 19.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....
Job No..... Day started..... Day finished.....

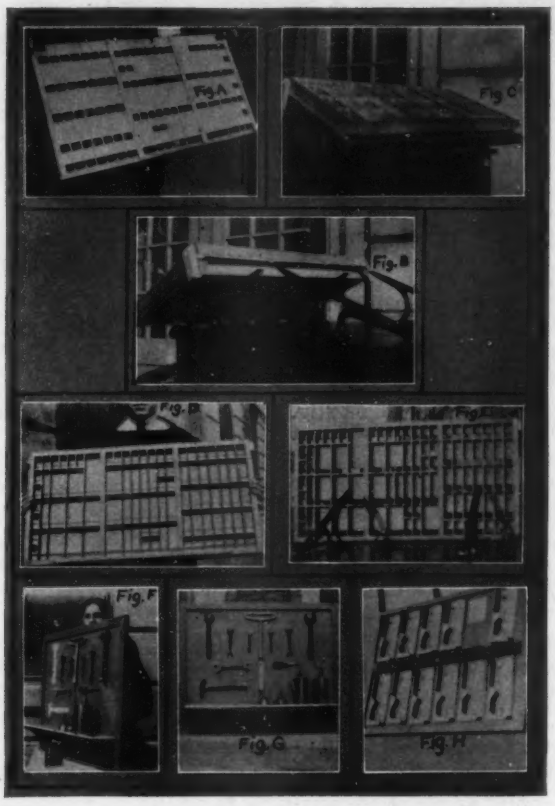
Sample C

racks can be easily made of scrap lumber, the sizes varying according to the number of tools they are to hold.

When used in the following manner, these devices are an asset to any school shop:

Everything in the shop is numbered, so each boy can be held responsible for everything he uses. A name card, Sample B, is attached to every job sheet with a wire clip and they are kept on file at the instructor's desk. As a class is passing into the printshop, the teacher hands each boy his job sheet. The boy, in turn, takes off the name card as he passes by the composing-stick rack, takes down his stick and hangs the card in its place (See Fig. H). The job sheet he keeps with him for reference while he works. Then he goes to the galley cabinet and takes out his work. This also is numbered. By the use of his filled-in job sheet he knows with what cases he should work. If he finds anything out of place in the case, he reports it to the instructor, who can then trace from the job sheets of the previous class who is responsible for the trouble.

After the pupil has composed and made perfect his job, he shows his final proof and job sheet to the instructor. The proof is checked O.K. on the sheet, and he is ready to distribute. When he has dropped his type in place in one of the distributors he again takes his sheet to the instructor, who looks over the work, and if everything is well done the type is taken (in the distributor) back to the original case. Here it is



dropped in the right boxes. The distribution is then checked O.K. on the job sheet, and the sheet is placed in the O.K. files for credit. The boy takes a new job sheet and fills it out for his next job, writing in what size and styles of type he is going to use and the numbers of the cases. He shows this to the instructor, and if all is correct, the sheet is checked and the boy begins the new job.

Five minutes before the period is over the *clean-up* signal is given and every boy ties up his work in his galley and begins putting away any articles that he has used, and straightening things about the shop. Before the passing bell is sounded, he hangs up his composing stick and puts the name card with his job sheet. When the bell rings, the instructor can, at one glance, see if everything in the shop is or is not in perfect order. As the class passes out, the boys hand in their job sheets, which are placed on file until the next day.

Good bulletin boards are very essential in a school printshop. Charts and samples can be posted and students' work displayed.

Another incentive for the boys and a help for the instructor is the record sheets, Sample C, which are kept clipped on the job sheets. With these the boys can see how they are progressing and how much time they are using on each job. At the end of each month the grading is lightened for the teacher. It is found desirable to post the five nearest filled sheets of each class on the bulletin board at the close of each month. This is another goal to work for. The boy who has had bad luck one month has as good a chance the next month as any other member of his class.

The writer also recommends that each boy be assigned to some particular duty in cleaning and caring

for the shop at the close of his class. This gives him a responsibility which develops within him pride in taking care of the shop.

Another way to cause greater effort on the part of the pupils is to form a printing club, and make only those eligible for membership who make a grade of 95 in printing and who are on the school honor roll.

THE TYRANNY OF THE MACHINE

Laurence Parker, Kansas State Teachers College, Pittsburg, Kansas

MR. ARTHUR POUND a few years ago took occasion to warn us of the domination of "The Iron Man" in industry. We are fast coming under the domination of the machine.

The machine has entered our daily life and must be reckoned with if we are to be happy and contented. By way of illustration, here are a few pages from the diary of a housewife:

Sept. 10th—Vacuum cleaner refuses to clean the rugs. Makes a humming noise and brush turns round but no results. Phoned the service man. $2.35 from my housekeeping allowance to Junior to buy lumber to build cedar chest.

Sept. 15th—The man returned the vacuum cleaner. His bill is $4.85, and he gave me a long conversation about commutators and brush adjustment. Electric iron stopped heating this morning. Neither Friend Husband nor Junior can make it go. Why don't they teach flat-iron fixing in school? Left the iron at electric company's office.

Sept. 18th—Got my iron today after paying $2 repair bill. Man claimed heating unit was gone and needed new cord. Can't see how we are going to eat all month the way our housekeeping allowance goes for repairs.

Sept. 20th—Paid a man $1.50 to sharpen two razors and a carving knife. Asked Junior about doing it, but he says they don't learn to sharpen saws at school. Wish I had the money we have spent having razors sharpened since we were married. Might be able to endow a chair for that sort of thing in some university.

Sept 23rd—Junior got out of mowing the yard today and the poor old housekeeping allowance was the goat. Had to hire the yard mowed. Junior showed me why our mower won't cut grass, although new in the spring. He claims that it needs some sort of sharpening. He can't do it. I urged him to try and when it was time to go to school he couldn't even get the wheels to turn. Junior is making a cedar chest at school.

Oct. 1st—Car stalled down town traffic as I was trying to get Friend Husband to his train. He is the most helpless man. Garage man towed us to his place and replaced what he called "points," and cleaned carburetor. Not over ten minutes work and an $8 bill.

Oct. 15th—Thought we were going to save something this month, but Junior and his father have brought home a $185 radio set which they think will bring in the world. Of course it is nice, but it's a lot of money. Helen writes that her boy built one at school for $25 which brings in Havana. Wonder what is the difference in sets.

Oct. 24th—Cleaning woman broke a small windowpane today. Suggested to Junior that he cut a new one out of some large pieces in the basement. Says he don't know how and neither does his father. Man from the store cut and put in the glass. Once more the housekeeping money is tapped to buy material for a magazine rack Junior is making.

Cedar chest came home today. No room for it in the flat and have stored it in the attic.

Nov. 12th—All the kitchen knives are dull. Junior claimed he couldn't sharpen them. His father "operated on" the carving knife and I'll send them out from now on.

Nov. 13th—It's the 13th all right. Washing machine stopped in the midst of its job today. Took two hours for a service man to come out to fix it. I watched him repair the cord and replace fuse. Wonder why they didn't teach me some of those things at school. I would be $2 better off today if they had.

Nov. 18th—Met Mrs. Shavings, wife of our manual-training man, today. I feel better ever since, for she has the same troubles as I do. Admits her husband can make beautiful furniture, but he is helpless around the house with the sweeper, lawn mower, and radio. She complains of the delays and expense of getting service men.

Dec. 20th—Junior tells us that a course in household mechanics is to start next semester at high school. He wants to take it in place of woodwork.

Feb. 10th—Junior surprised me today. Brought home three electric irons he had rummaged out of the attic. Repaired them at school in the new course at a cost of 60 cents.

Feb. 15th—Allowed Junior to take the old lawnmower to school. They can't hurt it no matter what they do.

Feb. 25th—Junior brought home the mower and an electric fan. Mower looks fine and he thinks it will cut. Junior traded our old toaster and an iron for the rebuilt fan.

Feb. 28th—Junior cleaned and oiled the washing machine. Ella can hear me when I call her now, it runs so quietly.

April 10th—Home is a different place these days. I feel as if I had a service man always at hand. Was able to have steak for dinner tonight, since these repair men are not dipping into my household allowance.

If we had the time to follow this housewife's diary further, we would run into further instances where the burden of upkeep of family machinery has been taken over by Junior who is in a household-mechanics course.

CHOOSING A VOCATION

It is our business, as directors of public education, to provide the information and to afford the education that will enable pupils to make an intelligent choice of the vocation which they wish to pursue; it is our business to advise with parents and pupils with reference to such a choice, and to help them to make a wise decision based upon ability, inclination, and opportunity; it is our business to help them prepare for entrance upon the vocations of their choice. It is the big business of a community, large or small, to prepare its young people for life; and an important part of life is the ability to make a living; for a life is not likely to be well lived unless one is engaged in a congenial occupation, and in one in which he is reasonably successful. — *Randall J. Condon.*

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts and Vocational Education. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

A SHOP SIGN

Alfred B. Grayshon, Jay Cooke Junior High School, Philadelphia, Pa.

The accompanying illustrations show a shop sign made of No. 26 galvanized iron with a hanger of ⅛-in. strap iron which can be made by the boys as a club or class project to advertise the type of work done in a particular shop. It should be hung over the door of the shop and electrified.

Lay out and cut the box pattern.

The block lettering for the name of the shop is laid out on the 7 by 24-in. sides of the box by the method shown in Figure 1, and cut out with a chisel or bench nibbler. The edges of the letters must be filed smooth, if they have been chiseled out. Next, bend the folds on the ends AB opposite to the side on which the letters were laid out. Then make the bends on lines C, D, E, F, to bring the sides at right angles, as shown in Figure 2. The end pieces are of two different lengths, the hole being located only in the longer one. After laying out, cutting and bending as shown, locate the longer piece in the folds at end A of the box. These ends, are permanently held in place by double seaming, the steps of which are illustrated by Figures 3 and 4. The angle pieces, of which there are two, are riveted or soldered in place ¼ in. from the bottom of the box, as shown in Figure 2. This ¼-in. space will receive the bottom or slide of the completed box.

Measure for glass allowing at least ⅜ in. all around to cover the lettering, and locate four or six tabs on the inside of the box to hold the glass in place. Frosted glass is preferable.

Cut the strap iron to the proper lengths and file the ends square. The sharp bends are done in the vise with a heavy hammer. The twists are accomplished also in the vise, with a monkey wrench. After shaping the pieces, drill No. 28 holes for ⅛-in. rivets, and ¼-in. holes for fastening to the wall and sign. Drill the holes in the box to suit, and use cross straps inside as washers and stiffeners.

A porcelain base socket should be located either at the top or end of the sign, and the wire should be run out through the ⅜-in. hole of the end toward the wall.

The outside of the sign should then be enameled.

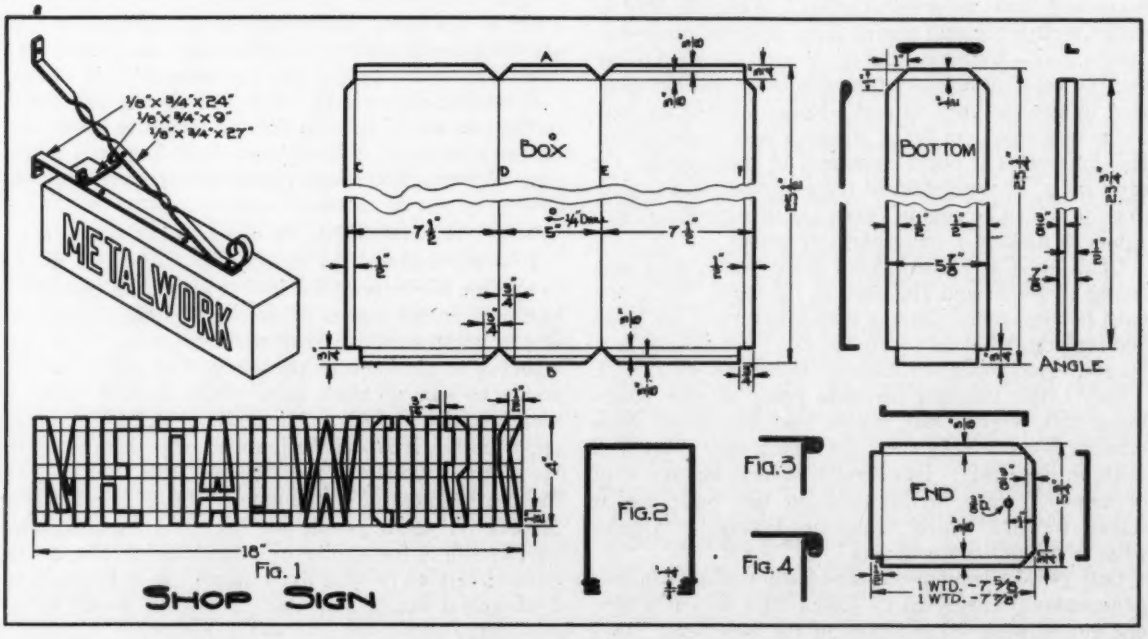
USEFUL SHOP SIGNS

C. M. Jochem, Jr., Junior High School, Pompton Lakes, New Jersey

The shop teacher comes into closer contact with his boys than any other teacher, and this affords him an opportunity to help build up the proper character, which is so essential to a well-educated citizen.

Many shopmen neglect this important phase of education. The overworked excuse, of lack of time, is weak because there is time for all educational work if the work is organized and schedules are arranged in a systematic order.

The sign described herewith is one solution to the problem of how to influence the character of the boys. It is hung in the shop in the most prominent place, and being painted in bright colors, adds to the appearance of the shop. A new character-building sentence is put up every week. After each

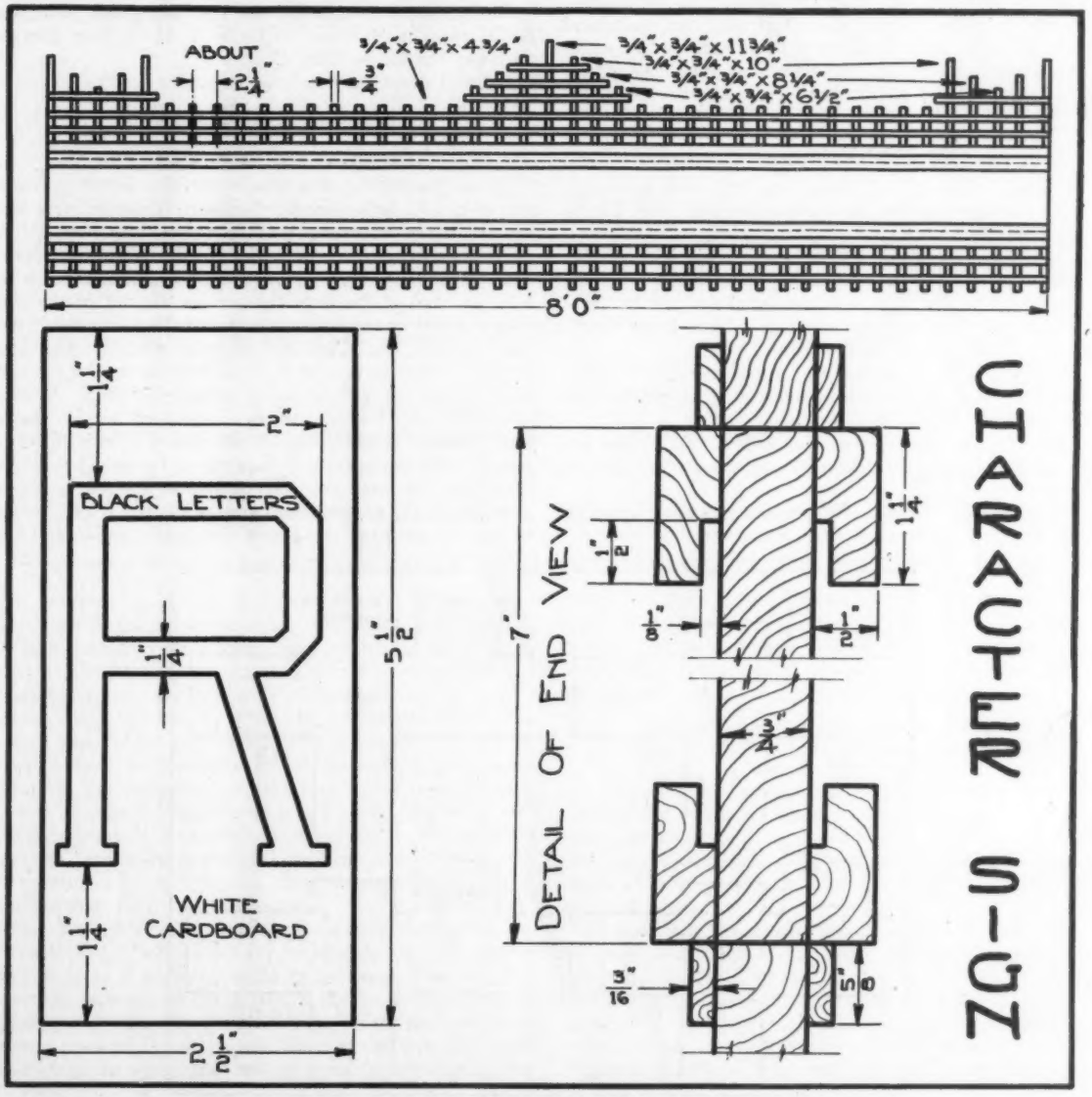


MANUAL-TRAINING DEPARTMENT, POMPTON LAKES PUBLIC SCHOOLS, POMPTON LAKES, NEW JERSEY

class has assembled, the period is opened with a brief talk on the "character builder" for that week.

There are numerous sayings, holiday greetings, and general instructions, which the sign can convey to the boys. In the two years in which this sign has been used, a marked improvement in the general character of the boys who attend this class has been noticed.

Some suggested "Character Builders" follow:



Be on the square
Be neat and tidy
Try again
Think before you act
Silence makes thought possible
Quality before quantity
It is not your privilege to talk back
There is always time for courtesy
Idleness is dangerous
Honesty pays big dividends
Help yourself by helping others
Be prompt
Do you throw away money? Time is money. Why waste it?
Happy New Year
Merry Christmas
Be careful
Make each job your best
Start the New Year right
Do you help your parents whenever possible?

SCHOOL TRAFFIC PROBLEM

R. R. Bedker, Junior and Senior High School, Wauwatosa, Wisconsin

We are depending more and more on mechanical means to solve traffic problems. Obviously the majority of "grown-ups" and children alike respond more accurately to mechanical devices in traffic than to officers. Traffic officers are easily misunderstood and the personal element is sometimes irritating to both parties. Automatic and semiautomatic traffic devices are positive in their actions, and the chronic law violater has only the satisfaction of beating a "cast-iron pole" instead of a police officer.

The traffic problems in schools vary with each and every school, which means that no one method will solve all the traffic problems.

In our school the first "unit" is complete and our assembly is located in one end of the building in temporary quarters.

Possibly until the other units are completed, we will have a "bottle-neck" arrangement, because of the heavy traffic on the assembly end of the building.

The arrangement of our corridor at the assembly is shown in Figure 1, showing the possible congestion without a traffic officer or traffic sign.

Figure 2 shows the same corridor with a "traffic sign" embodying the keep-to-the-right idea, indicating the direction of traffic.

Figure 3 shows the possible arrangement, when using the inside turn as required by our new traffic code.

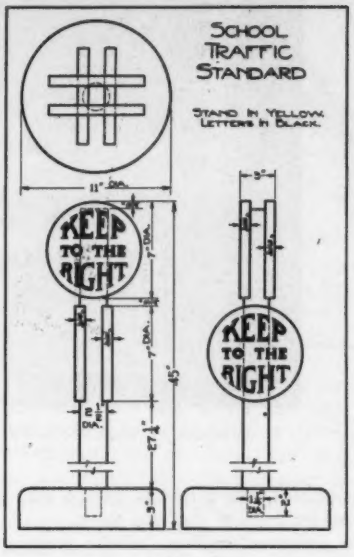


FIG. 5

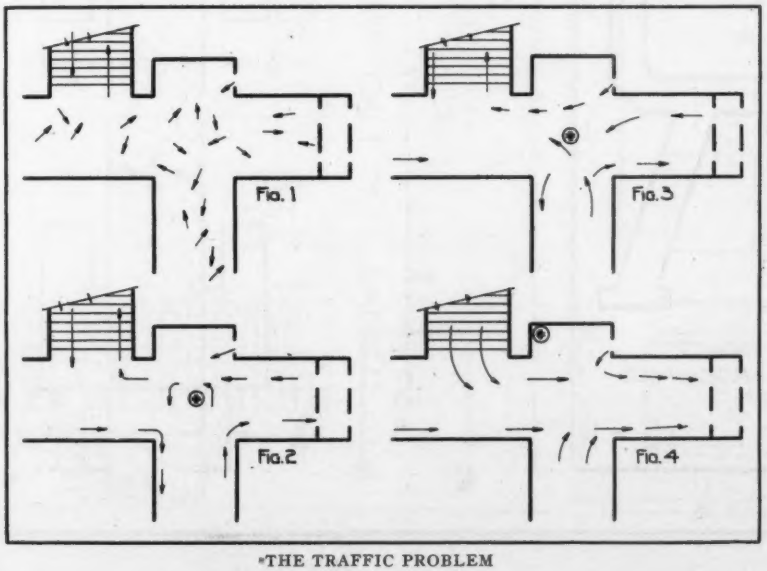
At dismissal it is suggested that the "traffic sign" be moved out of place, as is shown in Figure 4, as we have only the "one-way" traffic problem.

Figure 5 shows the details of the traffic sign.

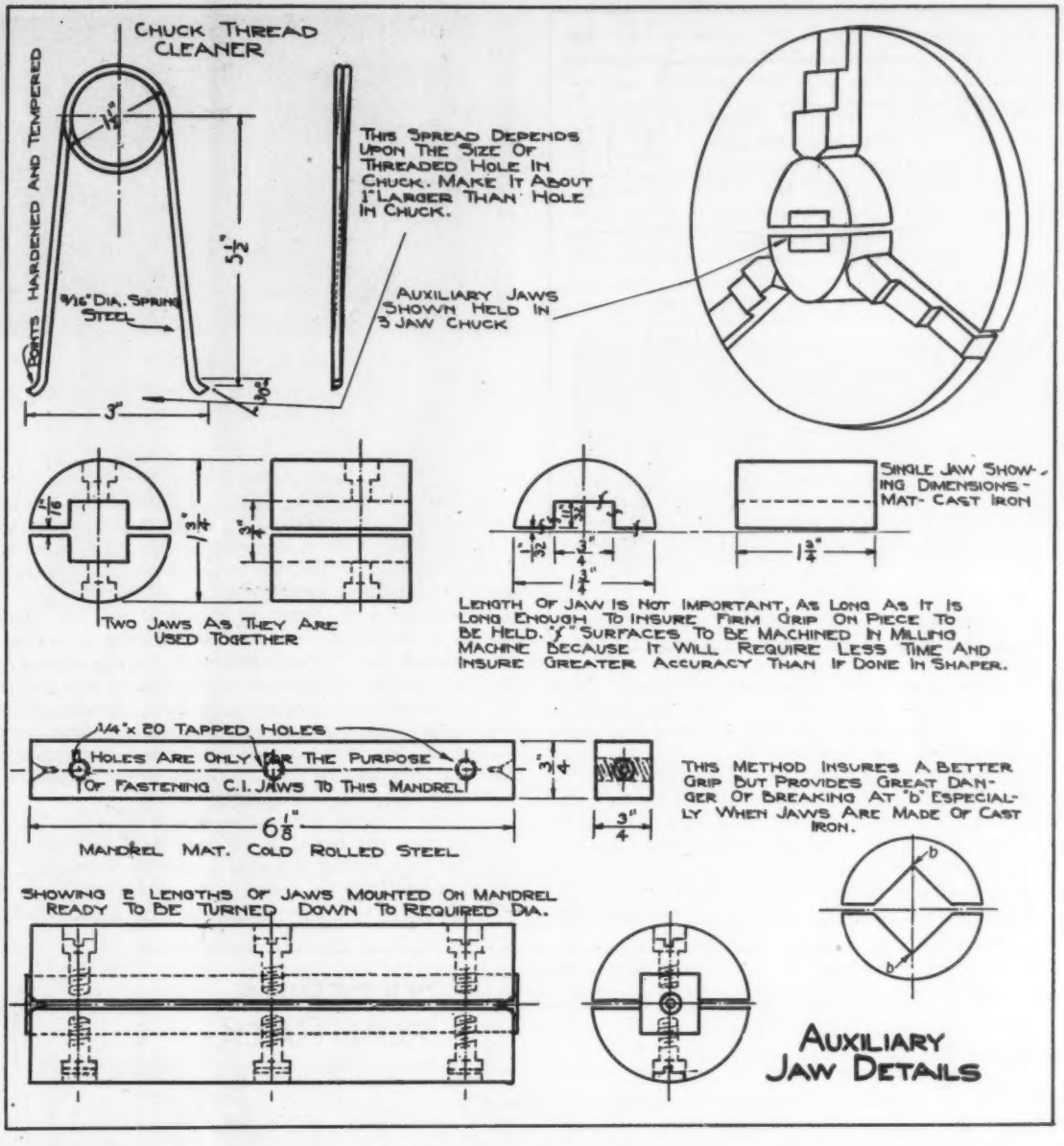
AUXILIARY CHUCK JAWS

Henry P. Boettcher, Snyder Junior High School, Jersey City, New Jersey

One of the regular class jobs in our shop is the making of an all-metal, hollow-handle hammer. Three-quarter inch, square, cold-rolled steel is used for the hammer head. Of the 12 lathe chucks, 8 are three-jawed and 4 are four-jawed. This meant that only four boys could do lathe work on the hammer head at the same time, while the rest of the class were engaged on some other operations. To facilitate matters, the auxiliary jaws illustrated herewith were devised. They are great timesavers, as there is no more laying the job aside until a pupil can get the use of a four-jaw chuck. A three-jaw chuck, fitted with auxiliary chuck jaws, will do just as well. Besides, the three-jaw chuck does not have to be removed from the lathe if it happens to be on. Time is thus saved and the wear and tear on spindle threads caused by screwing chucks on spindles is greatly lessened. Every teacher of machine-shop practice knows that pupils, especially begin-



*THE TRAFFIC PROBLEM


CHUCK THREAD CLEANER
POINTS HARDENED AND TEMPERED
9/16" DIA. SPRING STEEL
5½"
3"
THIS SPREAD DEPENDS UPON THE SIZE OF THREADED HOLE IN CHUCK. MAKE IT ABOUT 1" LARGER THAN HOLE IN CHUCK.
AUXILIARY JAWS SHOWN HELD IN 3 JAW CHUCK
TWO JAWS AS THEY ARE USED TOGETHER
SINGLE JAW SHOWING DIMENSIONS - MAT- CAST IRON
LENGTH OF JAW IS NOT IMPORTANT, AS LONG AS IT IS LONG ENOUGH TO INSURE FIRM GRIP ON PIECE TO BE HELD. "f" SURFACES TO BE MACHINED IN MILLING MACHINE BECAUSE IT WILL REQUIRE LESS TIME AND INSURE GREATER ACCURACY THAN IF DONE IN SHAPER.
¼"x 20 TAPPED HOLES
HOLES ARE ONLY FOR THE PURPOSE OF FASTENING C.I. JAWS TO THIS MANDREL
6 1/8"
MANDREL MAT. COLD ROLLED STEEL
THIS METHOD INSURES A BETTER GRIP BUT PROVIDES GREAT DANGER OF BREAKING AT "b" ESPECIALLY WHEN JAWS ARE MADE OF CAST IRON.
SHOWING 2 LENGTHS OF JAWS MOUNTED ON MANDREL READY TO BE TURNED DOWN TO REQUIRED DIA.
AUXILIARY JAW DETAILS

ners, are none too careful in the performance of this operation. Their intentions are good but their ability to accomplish the task sometimes meets with disastrous results. At any rate, they frequently nick the thread, either by not holding the chuck square with the spindle or by allowing chips to remain on the chuck threads. After the damage has been done the teacher has to file out the nicks or recut the thread. For cleaning chuck and faceplate threads the chuck thread cleaner shown in the illustration is therefore to be recommended. Several of these thread cleaners may be kept on hand.

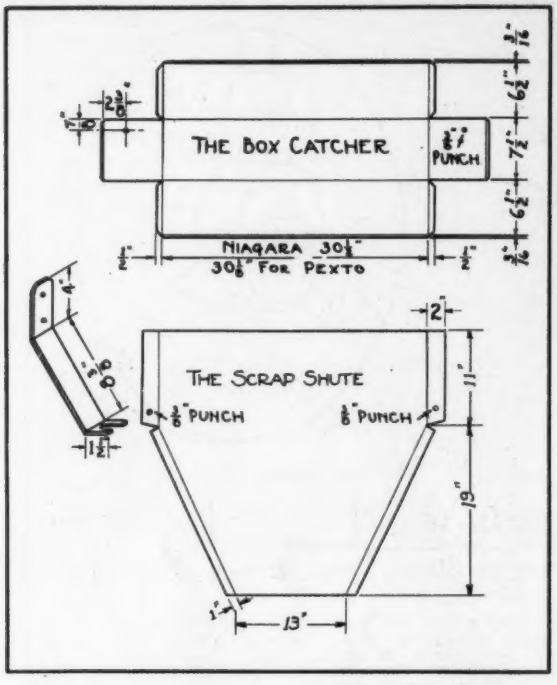
Auxiliary chuck jaws for jobs of various sizes and shapes might be kept on hand provided the jobs occur often enough to warrant their use. Besides, they prove to be very nice machine-shop projects for vocational boys, or even for advanced junior-high-school pupils. The sketch shows how the jaws are used. The drawings are self-explanatory. The square stock used as a mandrel should be accurately centered, because the accuracy of the auxilliary jaws depends upon how carefully and accurately the mandrel on which they are turned down is centered. After the two halves of the jaws have been fastened to the square mandrel, as shown in the sketch, they are turned down between centers in the lathe, then removed from mandrel and cut up into required lengths. It is well to number each pair of jaws so that the same pair may be always used together. It is better to make the jaws of cast iron, although machine steel can be used.

SQUARING-SHEAR SCRAP CATCHERS

David S. Taff, Jason Lee Intermediate School, Tacoma, Washington

The scrap from the squaring shears is a bother to the instructor and a bane to whoever has to dispose of it, unless some way to catch it, as it is cut, is provided. Two attachments are shown here which will take care of this scrap so that it will need to be considered only in the process of cleaning up the shop.

When a scrap box, or tub, is placed near the most common makes of squaring shears, a simple chute for sliding all scrap down into the container can be made out of No. 16 galvanized iron and suspended by the shear rod bolts. This attachment, when tightened in a horizontal position, makes an excellent catcher of motor or transformer laminations for the electric shop. Where these small pieces are commonly cut and



this device used a great deal as a catcher, lock washers should be placed on the bolts at each side to give the needed tension. Because the chute is much lower than the shear blade, complete cutting freedom is preserved.

Where the scrap box on the floor is undesirable, a catcher box may be attached to the moving shear rods to catch small cuttings and scrap. This catcher is nothing more than a simple box made of No. 24 galvanized iron, supported near the inner corners by the rod bolts and braced on the outer side by ¼ by 1-in. braces which are riveted to the box and held rigidly to the shear rods by the lower lock nuts of the turnbuckles.

SCRAP CATCHERS

Like the chute, this device does not impair the cutting freedom of the shear, yet it catches all the small pieces.

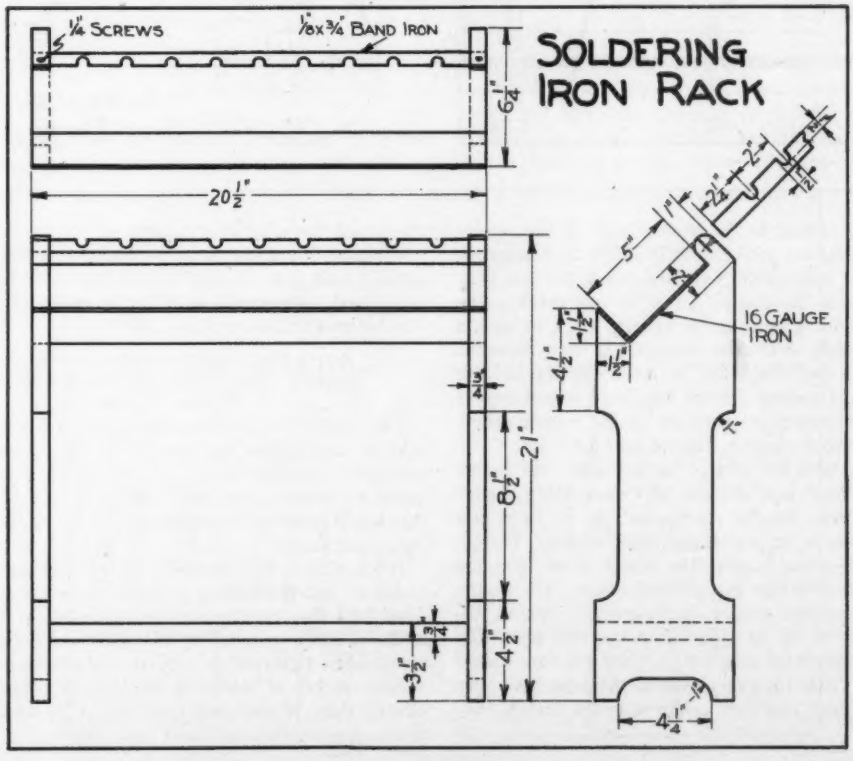
SOLDERING-IRON RACK

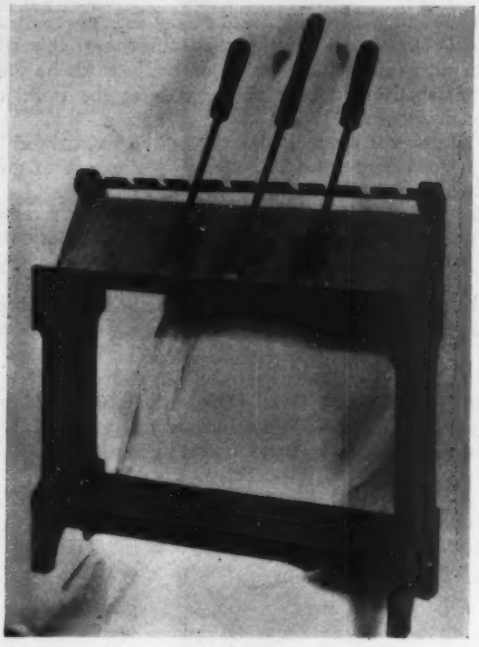
Nelson J. Murbach, Batavia, New York

In a general shop where there are approximately two hundred boys using the tools twice a week for forty weeks, time enters as a big factor in shop organization. Under such conditions, each minute that can be saved means a total saving per year of no mean proportion.

Sheet-metal work forms an important unit of quite a number of general-shop courses, and soldering, of course, is an important part of sheet-metal work. Usually a great deal of time is wasted at the start and the close of each period in the heating and cooling of soldering irons. The class of boys leaving the shop have to cool their soldering irons before leaving and the incoming class has to heat them up again. This is a waste of time for both groups, so the soldering-iron rack shown herewith was devised.

In it the soldering irons can be placed while still hot and be kept until the arrival of the next class. The next class when arriving, instead of having to heat the irons again, has the irons practically hot enough to use, if in condition to use, or to file if it is necessary to file them. This method of hand-





SOLDERING IRON RACK

ling the soldering irons saves time for two classes and also facilitates the handling and checking in and out of the iron at the beginning and the close of the period. When the irons are not being used, the rack can be set in some corner of the tool crib out of the way.

DISPLAY RACKS

A. Texeira, High School, San Jose, California

The blue-print rack described herewith, is composed of two pieces of angle iron into which heavy pieces of pressboard fixed upon rods can be inserted. The display boards lie practically flat against the wall when not in use. Both sides of the board can be used for mounting blue prints, since the board can be pushed against the wall in either direction. The entire rack is simply but strongly built. It is convenient and easy to handle. The pressboard is edged with heavy-gauge sheet iron as shown. The device is not only a help to the teacher, but it is convenient for the students as well, for the most important blue prints and helpful information are posted constantly, thus saving the students time and trouble in searching for them.

VERNIER CALIPER MODEL

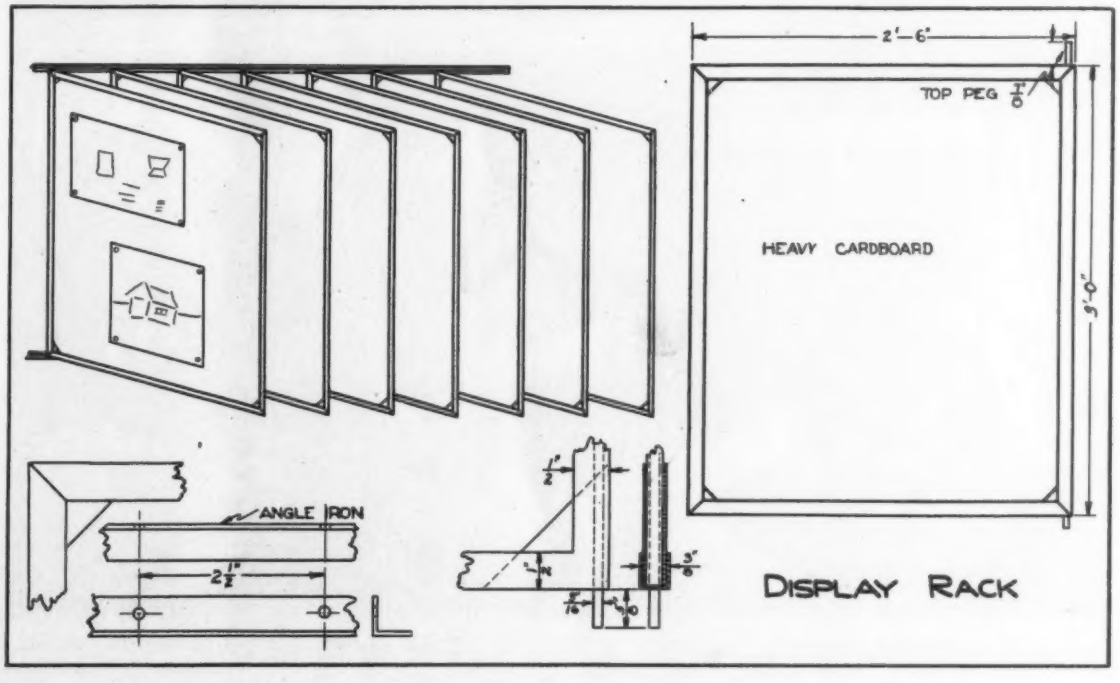
Edward N. Wallen, Textile High School, New York City

The model of the vernier caliper illustrated herewith was made of ¼ by 2-in. cold-rolled steel. The jaws are attached to the bars by flush rivets. The ends of the bar and of the jaws were milled halfway, so that when the pieces were assembled the surfaces were flush.

VERNIER CALIPER MODEL

The jaws were assembled before graduating in order to obtain the proper location of the zero mark on the scale and the vernier. The stock was clamped to the milling-machine table, leveled and aligned with the spindle. A lathe tool bit ground like a very thin parting tool was used for cutting the graduations. The tool bit was held between the collars of the milling-machine arbor, using another tool bit opposite the cutter, to equalize the clamping strain. The cutter was located for the first cut and the dial of the long feed handle was set at zero.

The cutting was accomplished by turning the cross-feed handle, pushing the stock against the cutter. Light cuts must be taken to avoid moving the stock out of alignment. The total depth of cut is .010 in. The zero and inch lines are 1 in. long, the hundredth divisions are ¾ in. long and the thousandth divisions are ½ in. long. The lines on the scale bar



are spaced .200 in. apart. The vernier scale is graduated in the same manner except that the spaces are .192 in. apart.

Steel letters are used for marking the divisions. A black paint may be used to fill up the lines, wiping off the surplus paint. This leaves the graduations standing out prominently and it is possible to see the lines from a greater distance.

A SHEET-METAL BRAKE

John Steinke, Empire Junior High School, Cleveland, Ohio

This article is a description of a brake which can easily be made in any school shop and provides a means for bending sheet metal when one has no standard brake.

The brake may also be of interest to an apprentice who wishes to try out his pattern cutting.

The entire job can be built without machinery, though, of course, if there are woodworking machines, it can be more quickly constructed. This brake, if solidly made, will bend IC tin or soft copper to its full length, and heavier tin and copper to nearly its full length. Should you desire to bend heavier metals or longer pieces, increase the sizes of the parts, not only the lengths, but the widths and thicknesses, as well.

In principle, it follows the same method used in the regular sheet-metal-shop brake excepting the way of holding the metal between the upper and lower jaws of the brake. In the shop brake, this is done by means of compound levers which clamp down the metal, but these are not so easily constructed. Using C clamps will prove just as satisfactory, although the work will be slower. The entire job can be made by some of the more advanced boys of the class as the work is not especially difficult.

White pine is the most desirable, of course, to work with, but a good hard wood is better if you expect to use the brake a good deal.

The following is a procedure which, with the accompanying illustrations should enable an advanced student to make the job without very much help.

Procedure

There are three principal parts to the brake: The bed, the holding jaw, and the bending blade.

Materials Required

Bed

1 pc.	2 x 6	x 24	White Pine or a Hard Wood
2 pc.	1 x 2	x 6	White Pine or a Hard Wood
1 pc.	¼ x 2½	x 24	Band Iron
4 No.	8 x 2-in.	f.h.	Wood Screws
12 No.	8 x 1-in.	f.h.	Wood Screws

Holding Jaw

1 pc.	1 x 4	x 23	White Pine or a Hard Wood
1 pc.	1 x 2	x 23	White Pine or a Hard Wood
1 pc.	¼ x 2½	x 23	Band Iron

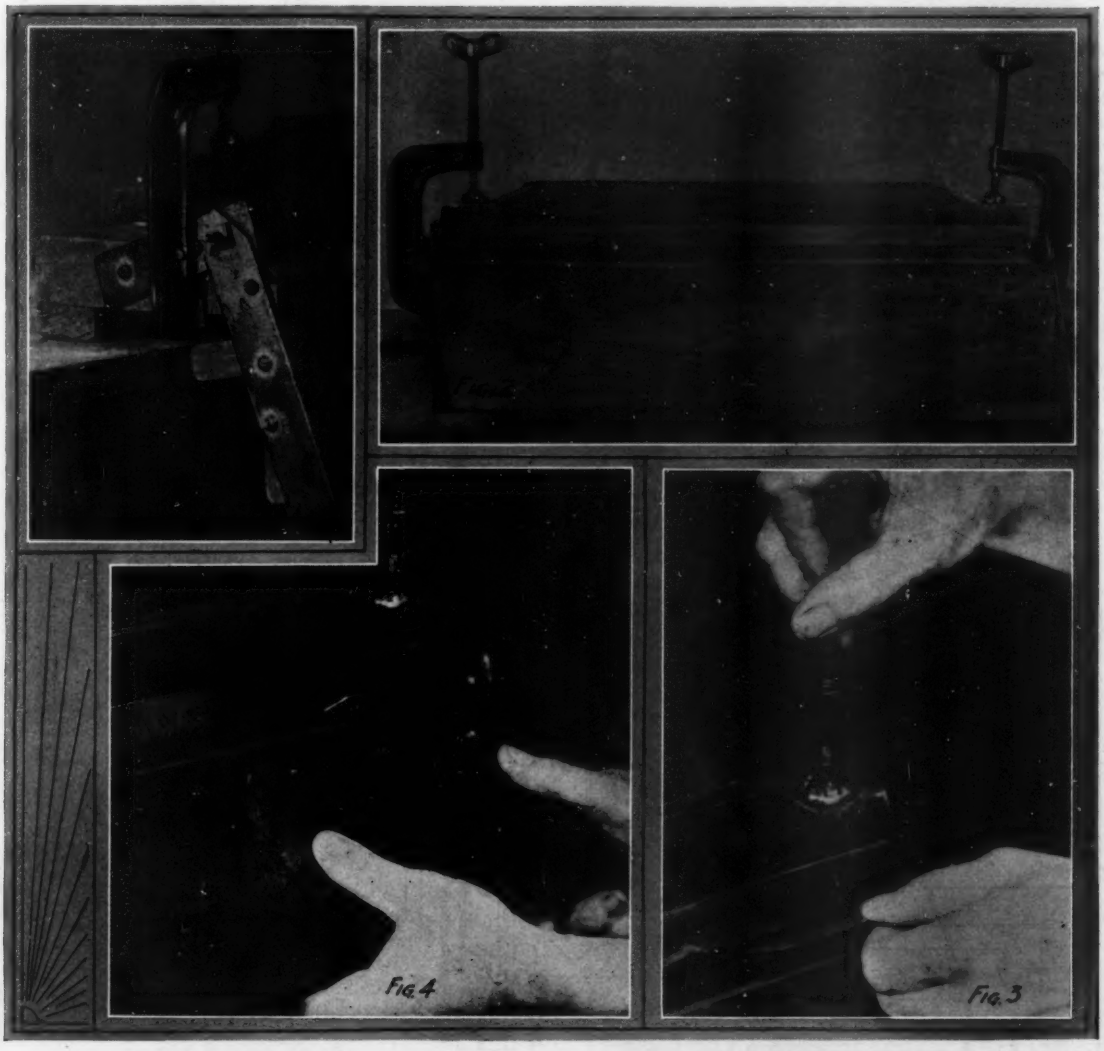
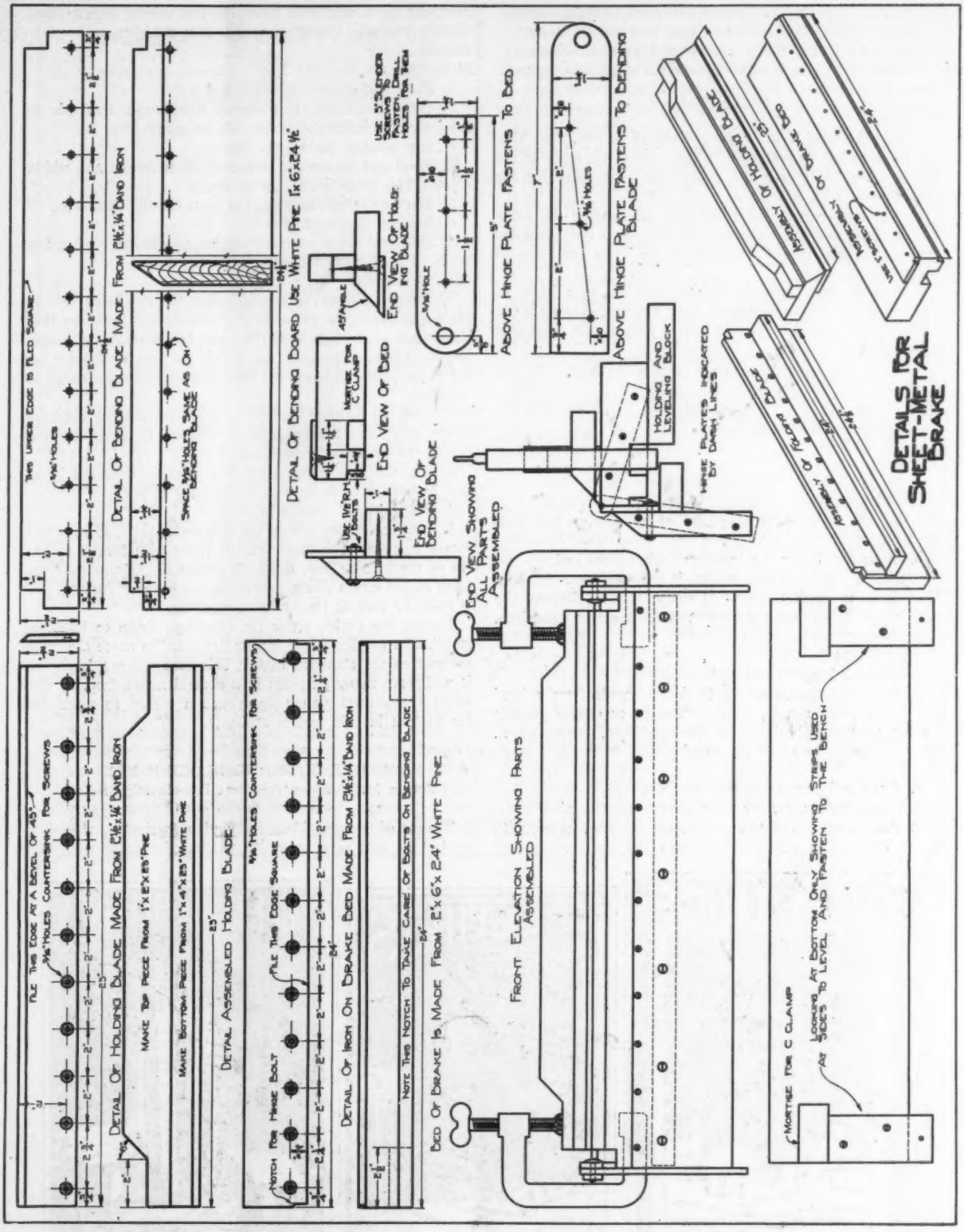


FIG. 1. END VIEW OF BRAKE.
FIG. 2. THE ASSEMBLED BRAKE.

FIG. 3. CLAMPING AND HOLDING THE METAL.
FIG. 4. MAKING THE FOLD.


DETAILS FOR SHEET-METAL BRAKE
DETAIL OF BENDING BOARD USE WHITE PINE 1"x 6"x 24 1/2"
DETAIL OF BENDING BLADE MADE FROM 1/16"x 1/4" BAND IRON
DETAIL OF HOLDING BLADE MADE FROM 1/16"x 1/4" BAND IRON
DETAIL ASSEMBLED HOLDING BLADE
DETAIL OF IRON ON BRAKE BED MADE FROM 1/16"x 1/4" BAND IRON
BED OF BRAKE IS MADE FROM 2"x 6"x 24" WHITE PINE
END VIEW OF BED
END VIEW OF BENDING BLADE
END VIEW SHOWING ALL PARTS ASSEMBLED
ABOVE HINGE PLATE FASTENS TO BED
ABOVE HINGE PLATE FASTENS TO BENDING BLADE
HOLDING AND LEVELING BLOCK
HINGE PLATES INDICATED BY DASH LINES
FRONT ELEVATION SHOWING PARTS ASSEMBLED
MORTISE FOR C CLAMP
LOOKING AT BOTTOM ONLY SHOWING STRIPS USED AT SIDES TO LEVEL AND FASTEN TO THE BENCH

12 No. 8 x 2-in. f.h. Wood Screws

Bending Blade

1 pc. 1 x 6 x 24½ White Pine or a Hard Wood
1 pc. 1 x 1¾ x 24 White Pine or a Hard Wood
12 No. 8 x 2-in. f.h. Wood Screws
12 3/16 x 1½ f.h. Bolts
1 ¼ x 2½ x 24½ Band Iron

To Assemble

2 4-in. C Clamps
2 pc. 1/4 x 1¼ x 5 Band Iron for Bed Hinge Plates
2 pc. 1/4 x 1¼ x 7 Band Iron for Hinge Plates Bending Blade
2 5/16 x ¾ Oval-Headed Bolts for Hinge Plates
12 No. 8 x 3-in. r.h. Wood Screws for Hinge Plates

2 pc. No. 20-gauge, 2 in. round for Star-Shaped Holders
2 No. 8 x 1-in. f.h. Wood Screws for Star-Shaped Holder
2 No. 8 x 1-in. r.h. Wood Screws for Bottom C Clamp
4 No. 8 x 3-in. r.h. Wood Screws for Flanges C Clamp

Working Steps

Band Iron

1. File the band iron for the bed square on one edge. Note the notch on the squared ends to take care of the bolts on the hinge plates. Drill or punch holes and countersink for the screws used. (See detail.)
2. File one edge of the band iron for bending the blade square. Saw notched corners. Drill or punch the holes for the bolts. (See details for location of holes and size of notches.)
3. File the band iron for holding the jaw, at a bevel of 45 deg. or less. (See explanation about this in following text.) Countersinking is done on the widest part of the band iron after beveling.
4. Drill holes in the bottom and side flanges of the C clamps.
5. Round the hinge plates and drill the holes. Do not countersink any of these holes.

The Woodwork

The Bed:

1. Plane block four sides; square the ends.
2. Mortise for the C clamps.
3. Rabbet the front to take care of the nuts on the bending brake.
4. Make and fasten the leveling blocks to the bed.
5. Fasten the band iron so that it projects about 1/32 in. This is done so that the wood when it warps beyond the edge of the block does not project in front of the band iron.

The Holding Jaw

Bottom Piece:

1. Plane and square to length.
2. Bevel the front edge to 45 deg. If made from a hard wood, the angle can be 35 deg. The lesser degree permits greater bending. The bevel on the band iron, in any event, must be the same as on the wood piece.

The Rib:

3. Plane and square the stiffening rib.
4. Shape the corners for the C clamp. (See detail.)
5. Put the bottom piece and the stiffening rib together with a few brads. (See detail for placing.) Put the band iron in position; mark and drill holes for the screws. Screw down tightly. The long screws used, also hold the rib.

Bending Blade

Main Piece:

1. Plane and square to length and width.
2. Plane the bevel. If made of hard wood, this can be more sloping, making it easier to bend many jobs.
3. Saw notches on the top corners.
4. Plane and square the stiffening rib to length and width. (Note: This piece is only 24 in. long.)
5. Mark and drill the holes for bolts for the band iron.
6. Bolt on the band iron.
7. Drill and screw on the stiffening rib. Fasten with a few brads to hold them while working.

Final Assembling

1. Take the short hinge plate and put the hinge bolt in place and screw the plate on the ends of the brake so that the center of the bolt is at the front top edge of the brake-bed band iron. If possible, use a bolt that has a shoulder for the hinge plates to work on. This adds to the smoothness of working.
2. Prop the bending blade in position so that the bending-blade band iron touches and so the top is level with the top of the brake-bed band iron.
3. Slip the long hinge plate into position over the hinge bolt and fasten it to the end of the bending blade.
4. Fasten the C clamps in place.
5. Put the holding jaw in position under the C clamps and locate star-shaped holders. Fasten these with screws to the rib of the holding jaw. Bend the points of the star over the knob of the clamp screw, and the brake is ready for use.

Paint or varnish the brake as you like.

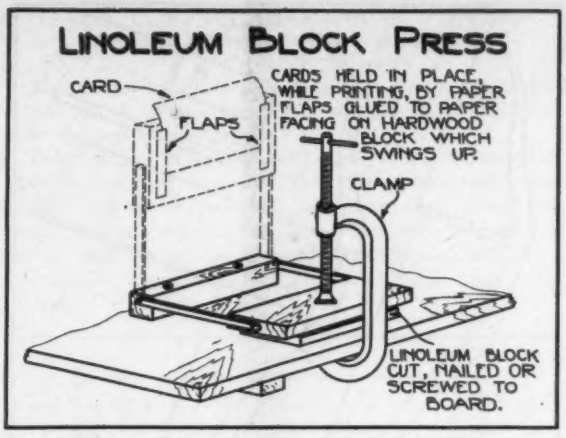
To use the brake, screw the C clamps down to hold the metal. The bending blade is lifted to bend in much the same manner as the standard brake. This brake is not large but it will serve many purposes in a general metal shop. It also offers the earnest young apprentice a means to work out his pattern in thin metals at home.

BLOCK CUTS AND BLOCK PRESS

Roman M. Hammes, Abraham Lincoln High School, Council Bluffs, Iowa

The art of linoleum block cutting is a fascinating classroom project as well as a profitable pastime for those who wish

TYPES OF BLOCK-CUT PRINTS PRODUCED ON THE LINOLEUM BLOCK PRESS


LINOLEUM BLOCK PRESS
CARD
FLAPS
CARDS HELD IN PLACE, WHILE PRINTING, BY PAPER FLAPS GLUED TO PAPER FACING ON HARDWOOD BLOCK WHICH SWINGS UP.
CLAMP
LINOLEUM BLOCK CUT, NAILED OR SCREWED TO BOARD.

to make it such. Each year new recruits are added to the list of block cutters.

The illustration shown herewith pictures a few of the cuts made by the author. Outlines in some are cut out, while in others they are left in relief. Either a smooth or rough-textured linoleum may be used. The author prefers a special cork linoleum of a rough texture. It is a trifle harder to cut, but the printed effect is more pleasing. First sand the surface of the linoleum, which has been glued to a wood block, to a perfectly flat plane, then the design may be sketched on with a soft pencil or transferred by means of carbon paper. A sharp penknife is really all that is necessary to cut the block, though there are special linoleum-cutting tools that facilitate the work.

Printers' ink gives very satisfactory results. The ink is placed on a sheet of glass and carefully rolled out so as to cover the roller evenly, then the roller is applied to the cut. In order to bring out the rough texture of the print, it will be necessary to wash the cut frequently with gasoline so as not to allow the ink to accumulate in the holes in the surface of the cut. It is well to wash any type of cut frequently to keep the proper quality of outline of the design, otherwise the ink will gradually be squeezed out over the edges, giving a slovenly appearance to the print. Colors may be graded up from the ground or vice versa. The author has used a deep-blue ground graded up to an orange-tinted sky by daubing a bit of dark-blue ink on a pane of clean glass, leaving a space and placing a daub of red, then another space and a daub of orange; the space depending upon the size of card to be printed. Roll across so the ink will be applied to the roller, blue at one end, red in the middle and orange at the other end. Slight shiftings of the roller will blend the inks and the gradation is accomplished. Apply roller to the cut in the same way. Many interesting effects can be obtained in this way.

One must remember to cut the printing backward in order to have it read correctly on the print to be made. The color of the cards or background has a decided relation to the artistic quality of the finished product. There are many beautiful card- or mat-board materials available at most stationers at a reasonable cost. A softer finished paper will be found to give best results in most cases. A little experimenting will repay one in the selection of card colors as well as in the colors of ink to be used.

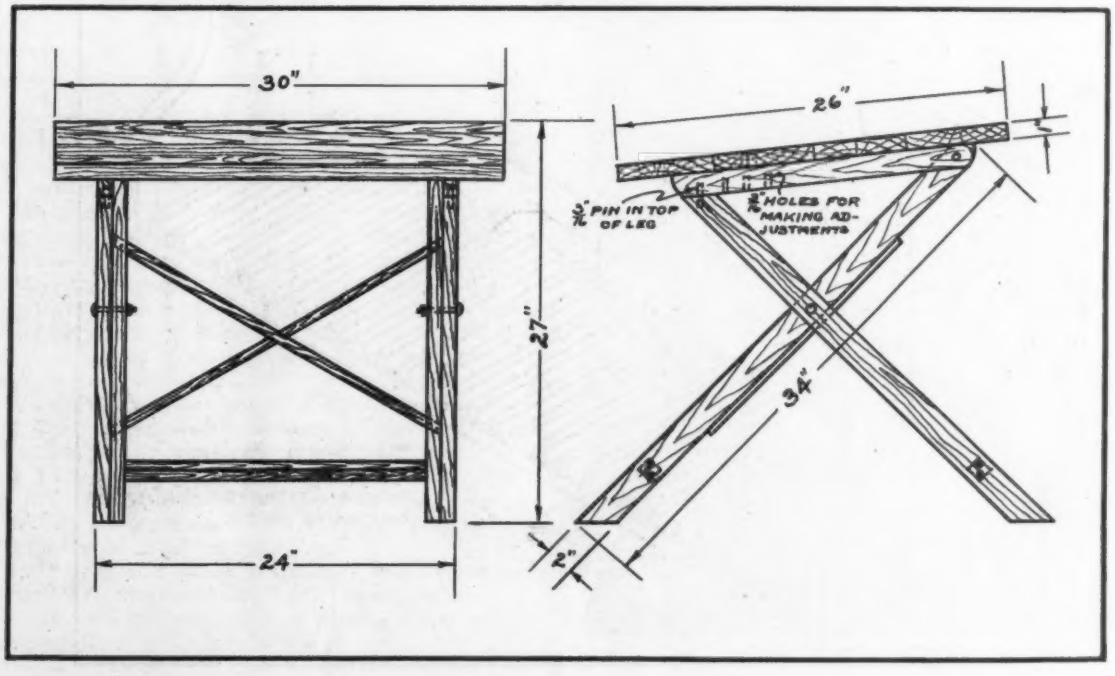
The blocks may be purchased ready-made and cut to convenient sizes, but it is much cheaper to make your own. If a press is used for the printing, the blocks must be type high. The author uses the homemade press shown herewith for printing. Any form of clamping device will give satisfactory results.

FOLDING DRAWING TABLE

G. E. McAfee, Township High School, Waukegan, Illinois

For drafting work in the home workroom or office, I have found the adjustable table given here to be very convenient.

The top is an ordinary drawing board 26 by 30 by 1 in., strongly bound at the ends. The dimensions of the top may be increased, if desirable, without changing the dimensions of the supporting frame. The frame is made of 1 by 2-in. poplar or any other well-dried, reasonably firm wood. The length of the longer legs is 34 in., while the shorter pair is 32 in. or 30 in. depending upon the slope desired. These legs are fastened in an X position, as shown in the drawing, by ¼ by 2½-in. carriage bolts, placed 20 in. up from the lower ends. Two 1 by 1¾-in. strips 20 in. long are set up edgewise and are screwed to the underside of the board, 22 in. apart. The upper ends of the longer legs are hinged to them at the back with ¼ by 2½-in. carriage bolts. A spike set vertically in the uppper (front) ends of the short legs fits into holes bored in the under edge of the strips. Several of these holes



in a row will make it possible to adjust the board to the height desired. Care must be taken to get the holes opposite each other at the two ends so the top will stand level. Cross bars are placed 6 in. from the floor at front and back and are held in place with long screws. These bars keep the legs evenly spaced. An X brace fastened to the back of the two longer (front) legs keeps the table firm. This brace may be made of ⅜ by ¾ by 40-in. strips.

This table is surprisingly strong and rugged. It may be adjusted so that it may be used with an ordinary chair or a high stool. It folds flat when not in use, and it is inexpensive to make.

T-SQUARE RACK

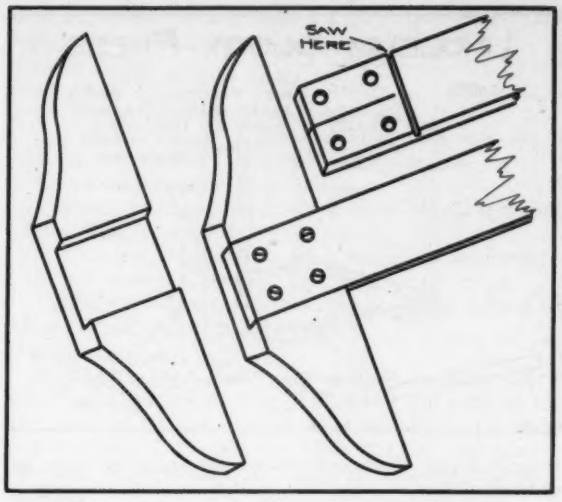
N. L. Apollonio, High School, Sacramento, California

The teacher of mechanical drawing found it necessary to construct a suitable rack for keeping T squares in order, because he had five periods for mechanical drawing, and the T squares had to be used by the students of each period. He numbered the T squares, and also gave each student a number. When a student comes into the room, he takes the T square which bears his number. For example, the student whose number is 5 takes No. 5 square. With a T-square rack, such as the one illustrated herewith, one can see at a glance that all the T squares are in place, and if one is missing, the teacher can check immediately which student failed to replace his instrument. Furthermore, the rack occupies a minimum of space and affords sufficient protection for the T squares.

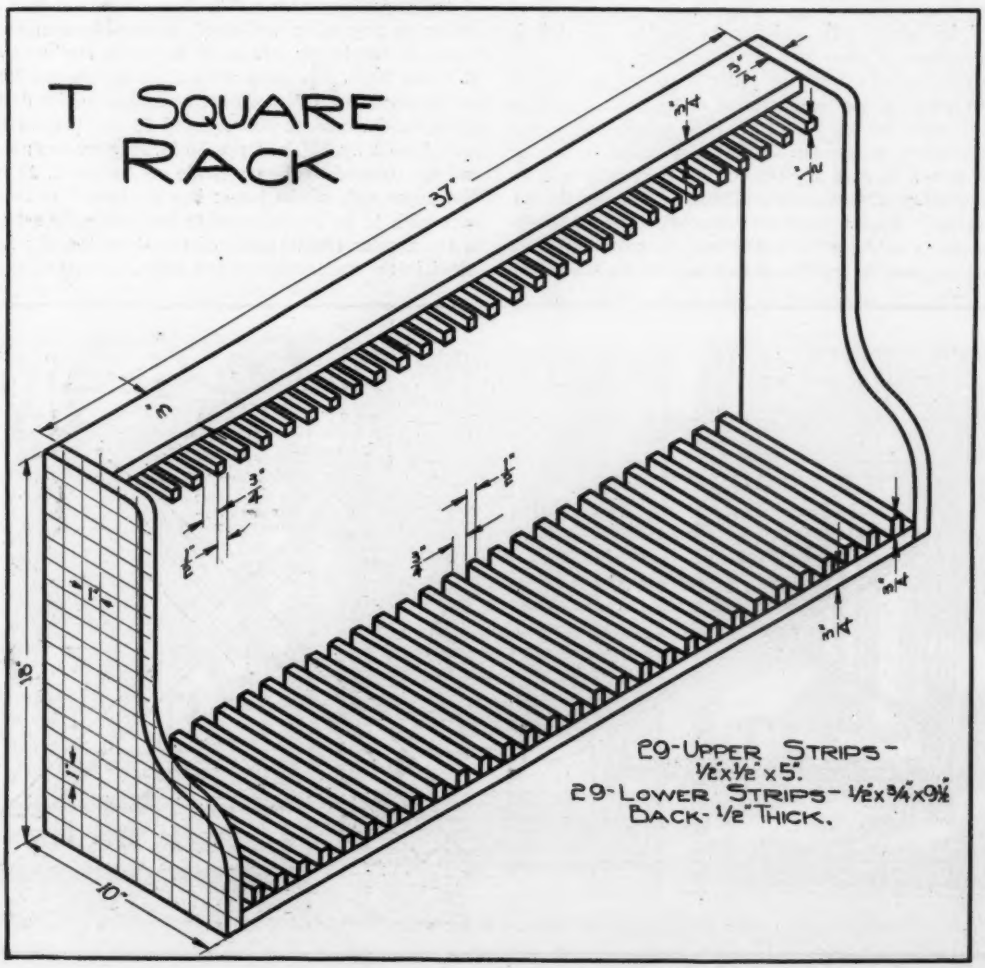
MAKING THE T SQUARE MORE SERVICEABLE

Robert E. Murray, High School, Fremont, Ohio

The method of repairing T squares described herein has



proved to be very satisfactory. From time to time the heads and blades of T squares become loose through use and abuse, thus causing inaccuracy. The accompanying illustration shows how one can readily overcome this difficulty. If the blade is split back a little way, saw off the portion that is damaged and then lay out and drill new holes for the screws. Then mark off the width of the blade on the head for a dado. Cut the dado just deep enough to allow the blade to be set in flush and firm. Glue may be used in addition to screws for making a more substantial joint.

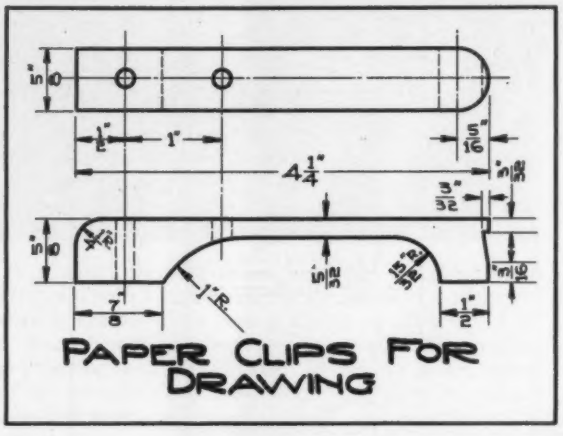


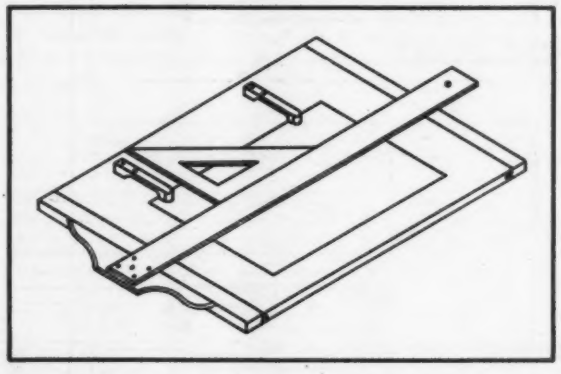
PAPER CLIPS FOR MECHANICAL DRAWING

Wendell C. Todd, Central High School, Grand Forks, North Dakota

The mechanical-drawing teacher who has been annoyed by the loss of thumb tacks in the drawing room will appreciate the paper clips described herewith.

The clips may be made of hard maple, birch, or some other hard, close-grained wood. The stock should be cut out to size, sanded, and the outlines for the curves marked out with sheet-metal or cardboard templates. They are easily cut out on the band saw, or the work may be done with the coping saw. Shellac and varnish will keep them from being soiled by use.

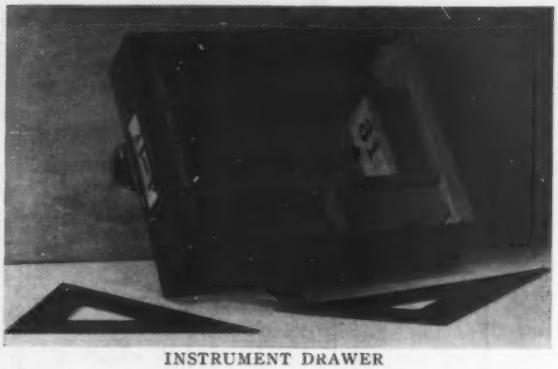




Number 9, 1¼-in. r.h.b. or nickel-plated screws are suitable for fastening them on the drawing board. The screw near the middle is used to adjust the tension on the drawing paper.

The paper clips have no advantage in drawing classes where each student is provided with a drawing board which he alone uses. They were designed for use in seventh- and eighth-grade mechanical-drawing classes, where but one board was supplied with each drawing table. Each student places his drawing in an envelope so that the following class will have the use of the drawing boards. The drawing clips have the following advantages:

1. They eliminate the checking of one item — thumb tacks.
2. The triangles are not damaged by coming in contact with them as they sometimes are when thumb tacks are used.
3. The drawing boards need not be replaced each year. No holes are punched into the drawing surfaces.
4. They permit the use of hard, close-grained woods in the construction of drawing boards.
5. The student is unable to use the T square for drawing vertical lines, thus encouraging proper drawing habits.
6. No holes are punched in the drawing paper, hence no trimming of the paper is necessary.



INSTRUMENT DRAWER

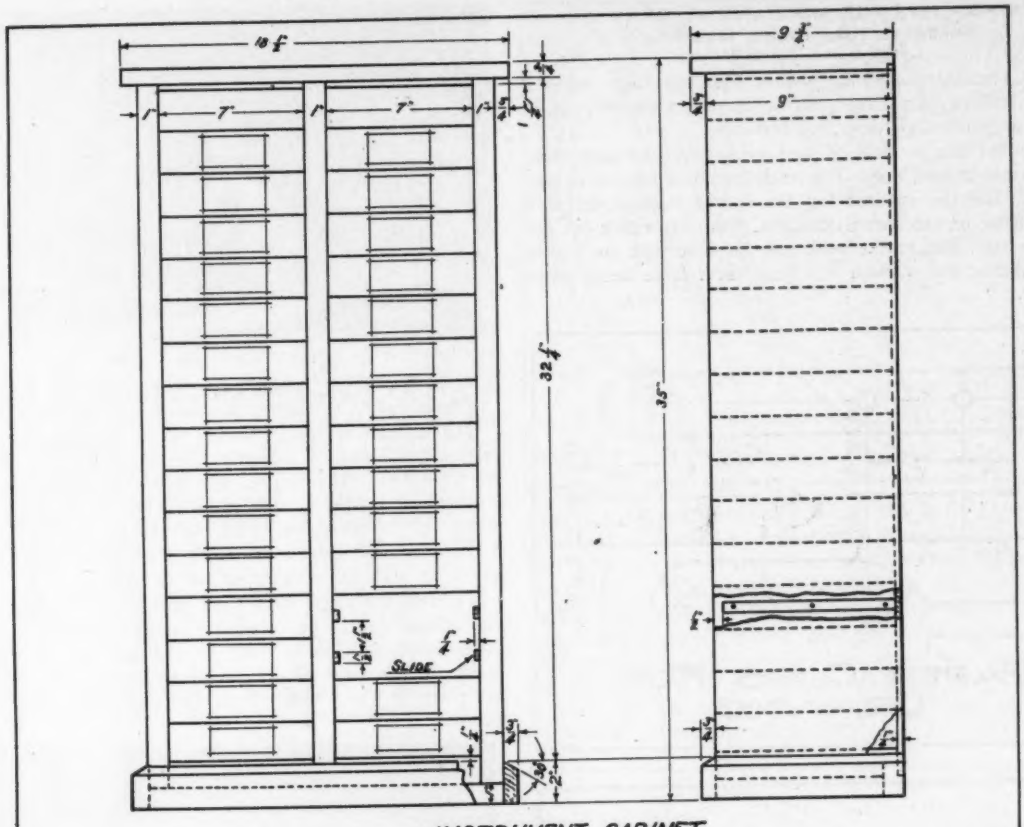
A MECHANICAL-DRAWING-INSTRUMENT CABINET

G. Bush and V. C. Rilling, Dawning School, Cleveland, Ohio

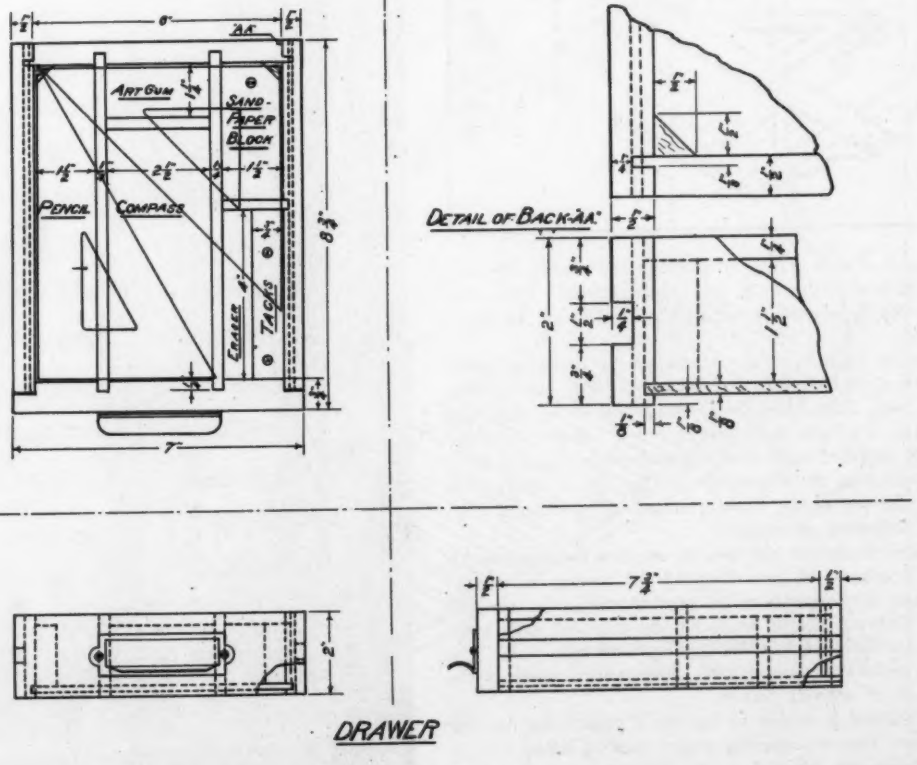
The instrument cabinet shown in the accompanying illustration has proved a valuable part of our mechanical-drawing equipment. The project was designed to hold all small instruments needed by the beginner's classes. Each drawer is numbered to correspond with the bench at which it is to be used. All instruments are stamped with figures which must check up with the number on the drawer.

Entering the room for a class period, each student passes the cabinet, takes out the drawer for the bench to which he is assigned, and checks over its contents before beginning work. At the close of the period he returns the drawer to its place in the cabinet. Thus the checking is simple and accurate.

INSTRUMENT CABINET



INSTRUMENT CABINET



DRAWER

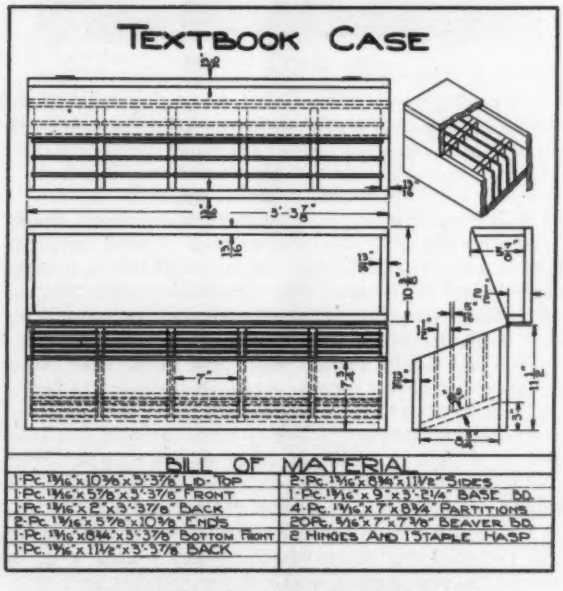
A TEXTBOOK CASE

Robert E. Murray, High School, Fremont, Ohio

The textbook case described in this article was made to fit on a window sill, since there was no other available space. With a few alterations, a similar case could be made to fit any existing conditions.

Each pupil's textbook has on it, plainly, a number which corresponds with a number on the partitions. At a glance the instructor can tell if any book is missing or misplaced. A list may be made with each pupil's name preceeded by a number corresponding to the book he uses. In this way several classes may use the same equipment and each pupil may be checked up to determine any property damage or loss which might occur.

This plan, therefore, cuts down on replacements and saves valuable teachers' time. It is a silent instructor in teaching students respect for equipment as well as efficiency and accuracy.


TEXTBOOK CASE
3'-3 7/8"
7"
BILL OF MATERIAL
1-Pc. 13/16" x 10 3/8" x 3'-3 7/8" Lid-Top
1-Pc. 13/16" x 5 7/8" x 3'-3 7/8" Front
1-Pc. 13/16" x 2" x 3'-3 7/8" Back
2-Pc. 13/16" x 5 7/8" x 10 3/8" Ends
1-Pc. 13/16" x 8 1/4" x 3'-3 7/8" Bottom Front
1-Pc. 13/16" x 11 1/2" x 3'-3 7/8" Back
2-Pc. 13/16" x 8 3/4" x 11 1/2" Sides
1-Pc. 13/16" x 9" x 3'-2 1/4" Base Bd.
4-Pc. 13/16" x 7" x 8 3/4" Partitions
20 Pcs. 5/16" x 7" x 7 3/8" Beaver Bd.
2 Hinges And 1 Staple Hasp

REPAIRING CELLULOID TRIANGLES

Stephen J. Smith, Snohomish, Washington

Repairwork on celluloid triangles may be done by using a cement made by dissolving a few small scraps of an old triangle in ten cents worth of acetone. If a triangle is cracked through one leg, separate the two broken edges and smear them liberally with the acetone solution. It will become tacky in a minute or two and the broken parts can be put back in place and laid away to dry. In an hour the triangle is ready to be smoothed off, should this be necessary. If the broken edges are sprung apart, lay the triangle between two pieces of glass while drying.

Notches or deep scratches can be filled out by putting on successive layers of a thick solution of acetone and celluloid. French curves or other celluloid articles, such as penholders, knife handles, spectacle frames, etc., also can be repaired this way.

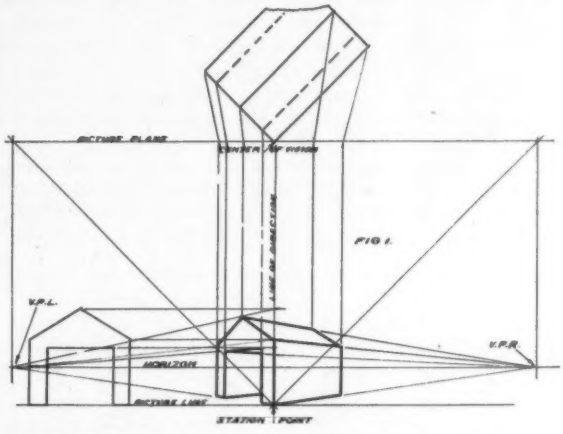
Should irregularities be in evidence after a joint or defect has been repaired with acetone, they may be smoothed with a dead-smooth file.

A DEVICE FOR TEACHING MECHANICAL PERSPECTIVE

George Heald, Los Angeles, California

Figure 1 shows a chart that was made on the back of an obsolete map about 5 ft. square. The drawing represents a building 12 ft. wide, 16 ft. long, and 8 ft. high to the upper outside edge, with a roof about one-third pitch drawn to a scale of 1 ft. equals 1 in. The station point was located 32 ft. from the center of vision, and the horizon 5 ft. 6 in. above the ground or picture line.

After the perspective was drawn, it was traced on a piece

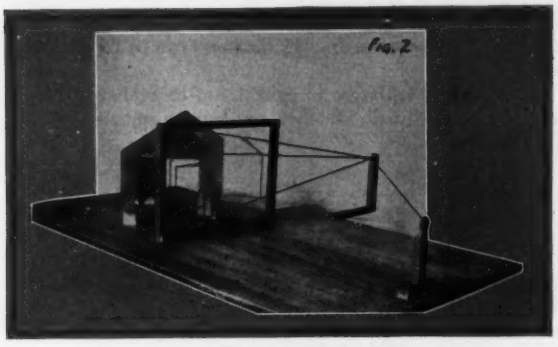


of celluloid such as is used in auto curtains. The celluloid was then tacked on a frame so that the picture line was parallel with the base and 2 in. above the base. The frame was mounted on a table top, with two dowels, coinciding with a line on the table representing the picture plane, as shown in Figure 2.

The model of the building constructed to the same scale as was used on the drawing, was mounted on the table at the same angle as the plan on the chart, with the corner touching the celluloid. The model also was raised so that its base was on a level with the picture line on the celluloid.

A wooden man, as we chose to call it, was doweled to the right end of the table 32 ft. from the celluloid, which corresponds to the position of the station point on the chart. A hole, representing the eye, was drilled at eye level in the wooden man. Students peeking through the hole see that the lines on the celluloid exactly coincide with the edges of the model. A bracket was mounted in a slot arrangement at the table having a hole drilled near the top. The location of this hole is at a point where a line drawn from the eye, parallel with the side of the model, touches the picture plane. This is easily located from the chart. Four strings were fastened in this hole, one running to the wooden man's eye, the others held in hack-saw slots cut on the left-hand side of the frame, so that they coincide with the lines on the celluloid. The students can clearly see that the parallel edges of a building vanish at a point on the horizon where a line drawn from the eye, parallel to the side of the building, touches the picture plane.

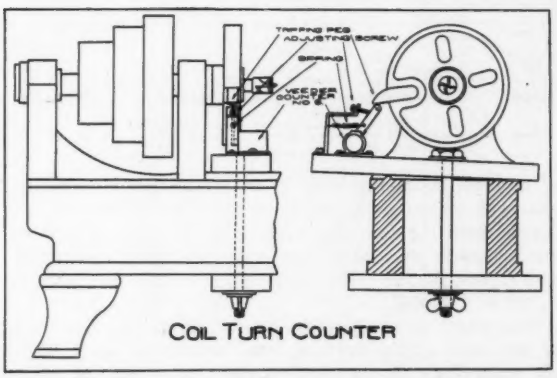
By making a study of the device and comparing it with the chart, the students got a clearer understanding of mechanical perspective, in a much shorter time than they did previously.



WINDING COILS ON A LATHE

E. A. Rerucha, Wakefield Township Schools, Wakefield, Michigan

Winding coils for electrical devices is more or less a tedious process for the average person, especially when the number of turns runs into the hundreds. Then also, mistakes are frequently made in counting the turns. The writer has in his shop a small 8-in. bench lathe which is used for drilling, wood turning, etc. It also is used for winding any coils which can be accommodated on it. In winding the coils the form, of course, is placed between the lathe centers in the usual manner. The lathe is equipped with a cone pulley so that three speeds are available and is belted to a small variable-speed motor. A belt tightener is provided as it is desirable to have the belt tight for drilling and turning, but fairly loose for

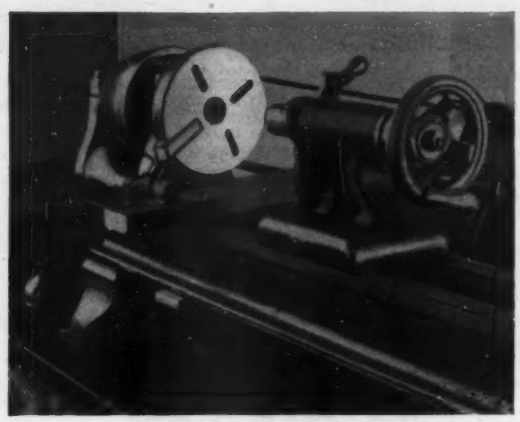


COIL TURN COUNTER

coil winding to enable stopping the revolving coil form with the hand on the cone pulley. For coil winding, the belt should be just tight enough to put sufficient tension on the wire fed through the operator's hands to wind the turns tightly and yet loose enough to permit almost instant stopping (allowing the belt to slip), when occasion arises, such as the overlapping of turns, etc. The advantage in using the lathe for winding the coils is due chiefly to the fact that they can be wound quicker. Of course, the speed at which this is done is too fast to enable the operator to count the turns accurately and at the same time guide the wire to wind the turns evenly. For this purpose, a simple and inexpensive turn counter can be made. An ordinary ratchet counter is used for this purpose. The writer uses a Veeder No. 6. The method of installing the device is shown in the accompanying illustration. The counter is mounted on a board about 1 by 2 by 10 in. The lathe is equipped with a drive plate with a slot. A wooden peg is fitted and driven into the slot so that it extends out far enough to trip the arm of the counter as it revolves. A bracket with an adjusting screw is mounted on the board back of the counter for adjusting the stroke of the arm. The adjustment should be such that the arm can be tripped by the peg far enough only to shift one number on the counter. A small coil spring holds the arm of the counter against the adjusting screw. The whole assembly is attached to the lathe when needed for coil winding by means of a bolt and thumb nut. Some adjustment for obtaining the proper stroke of the counter arm may also be made by shifting the assembly on the bed of the lathe.

When beginning the winding of a coil it is merely necessary to note the reading on the counter and add to that the number of turns required. This, of course, is the reading, when the desired number of turns has been wound. The operator need only occasionally glance at the counter reading and can devote most of his attention to the winding until he approaches the number of turns required.

With a few changes, the device described in this article can be applied to any lathe or power-driven, coil-winding device that may be used. If a driving plate is not provided, a peg may be attached to the coil form or clamped over the spur center.



COIL TURN COUNTER

For guiding the wire over the form, the operator should use a leather glove or a piece of folded leather, between which the wire passes to avoid burning the hand.

A HAND BORING RIG

R. R. Harding, State Normal School, Dickinson, North Dakota

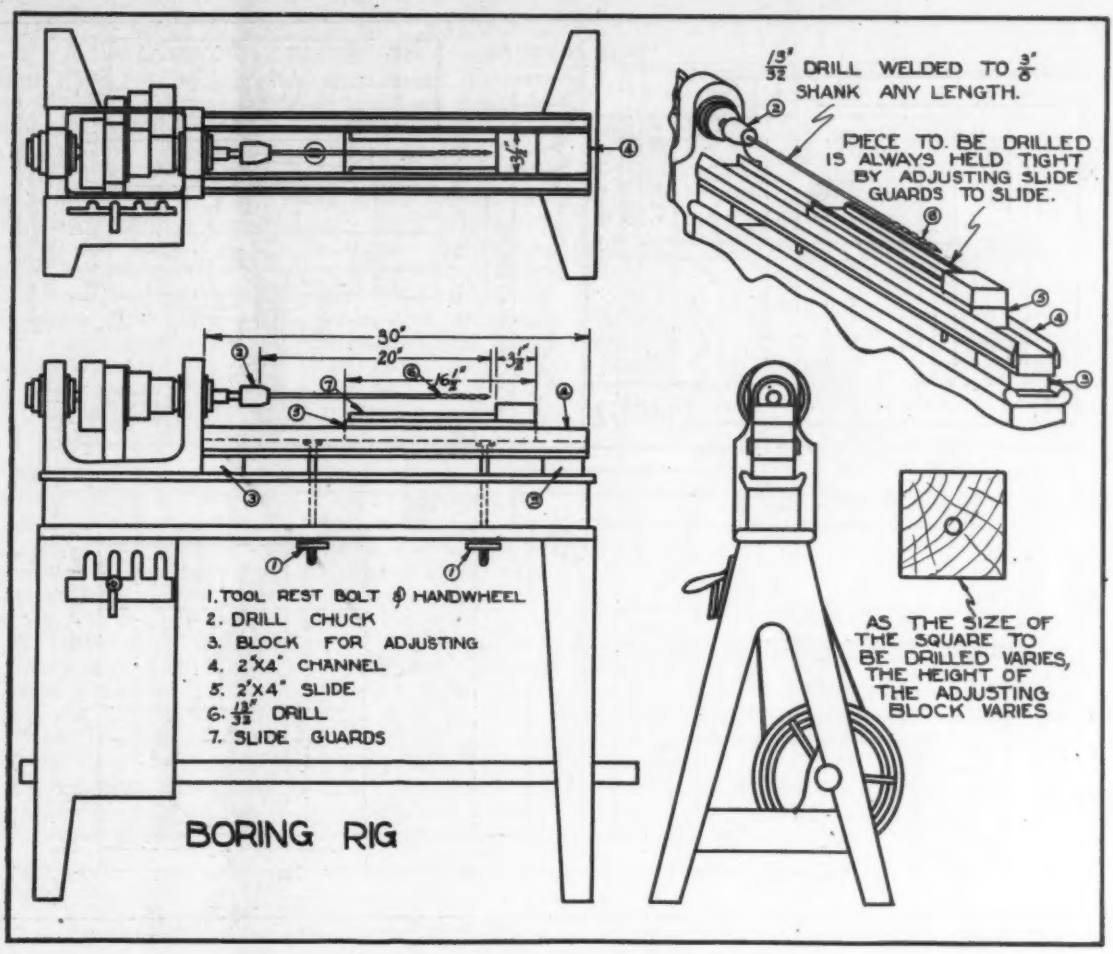
Probably the most interesting problem in wood turning is lamp making. This problem is very practical, and since lamps are so popular, and since they offer such a wide field for variation in design, it is quite permissible to spend some time on the subject of lamp making.

There are several methods which may be used for boring the holes through the uprights of the lamp stands. The boring jig illustrated herewith, was found to be very satisfactory. With this arrangement a hole may easily be bored in a solid piece of stock 2 by 2 by 24-in. After which it may be turned. Gluing up stock is all right, but a project made thus is not as easily made as if it were made of one solid piece.

Any shop that has a lathe can have this inexpensive, simple jig. The total cost to us was $1.25, and it made a dandy project for shop boys to work out.

The Different Parts Are:

1. The toolrest bolt and handwheel from two lathes. Any ½-in. bolt the required length would really answer the purpose.
2. A common drill chuck.
3. A 2 by 4-in. block or any block of common wood to build up the jig so that the square will center.
4. A piece of 2 by 4-in., 30 in. long with a strip of molding nailed to each side so that a channel is formed for the slide to run in.


13/32" DRILL WELDED TO 3/8" SHANK ANY LENGTH.
PIECE TO BE DRILLED IS ALWAYS HELD TIGHT BY ADJUSTING SLIDE GUARDS TO SLIDE.
30"
20"
3/8"
16 1/2"
1. TOOL REST BOLT & HANDWHEEL
2. DRILL CHUCK
3. BLOCK FOR ADJUSTING
4. 2"X4" CHANNEL
5. 2"X4" SLIDE
6. 13/32" DRILL
7. SLIDE GUARDS
AS THE SIZE OF THE SQUARE TO BE DRILLED VARIES, THE HEIGHT OF THE ADJUSTING BLOCK VARIES
BORING RIG

5. A piece of 2 by 4-in. planed to run smoothly in the channel. It has a 2 by 4-in. block nailed to the rear end. Two small strips are nailed to each side to form adjusting guards for the piece to be drilled.

6. A 13/32-in. drill welded to a 15-in. shank.

7. The adjusting guards are ¾ by ¾ by 16½-in. soft wood. These are tacked into place and are adjustable to accommodate any ordinary size square.

How to Install and Operate:

1. Remove the tailstock and toolrest from the lathe.

2. Put the channel (4) with the bolts (1) inserted, into place.

3. Make proper adjustments of the blocks (3) by using wooden wedges if necessary.

4. Put the slide (5) into place, loosen the slide guards (7), fit the piece to be drilled into place, straighten it up, tack down the slide guards.

5. Place the drill (6) into the chuck (2) and place it in the lathe. Pull the slide back far enough to allow the drill to take its proper place squarely in the center of the front end of the square to be drilled.

6. Start the drill (6) very slowly, let it drill its own hole. Do not crowd or pull.

7. When the hole is ½ in. deep, speed up the drill to its highest speed and above the slide (5) toward the drill. Let the drill cut about 2 in., then pull the slide back to a position where 1 in. of the drill is still in the square. This position can easily be marked with a pencil on the channel and slide. Do not, under any circumstances, permit the drill to run at full speed unless the point of the drill is inserted at least 1 in. into the square.

8. Continue pushing the slide forward until the drill is choked, then release it to clear out the drill until the drill appears in the rear end.

9. On long pieces, drill halfway through, then reverse the piece.

10. *a*) Remember the higher the speed the better.

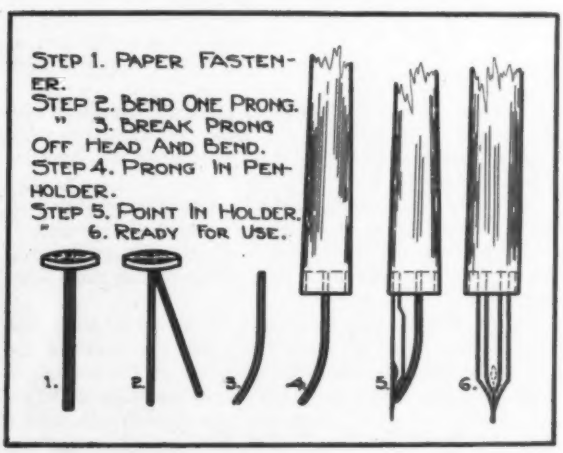
b) Let the drill cut its own start. Do not bend the drill even 1/64 in.

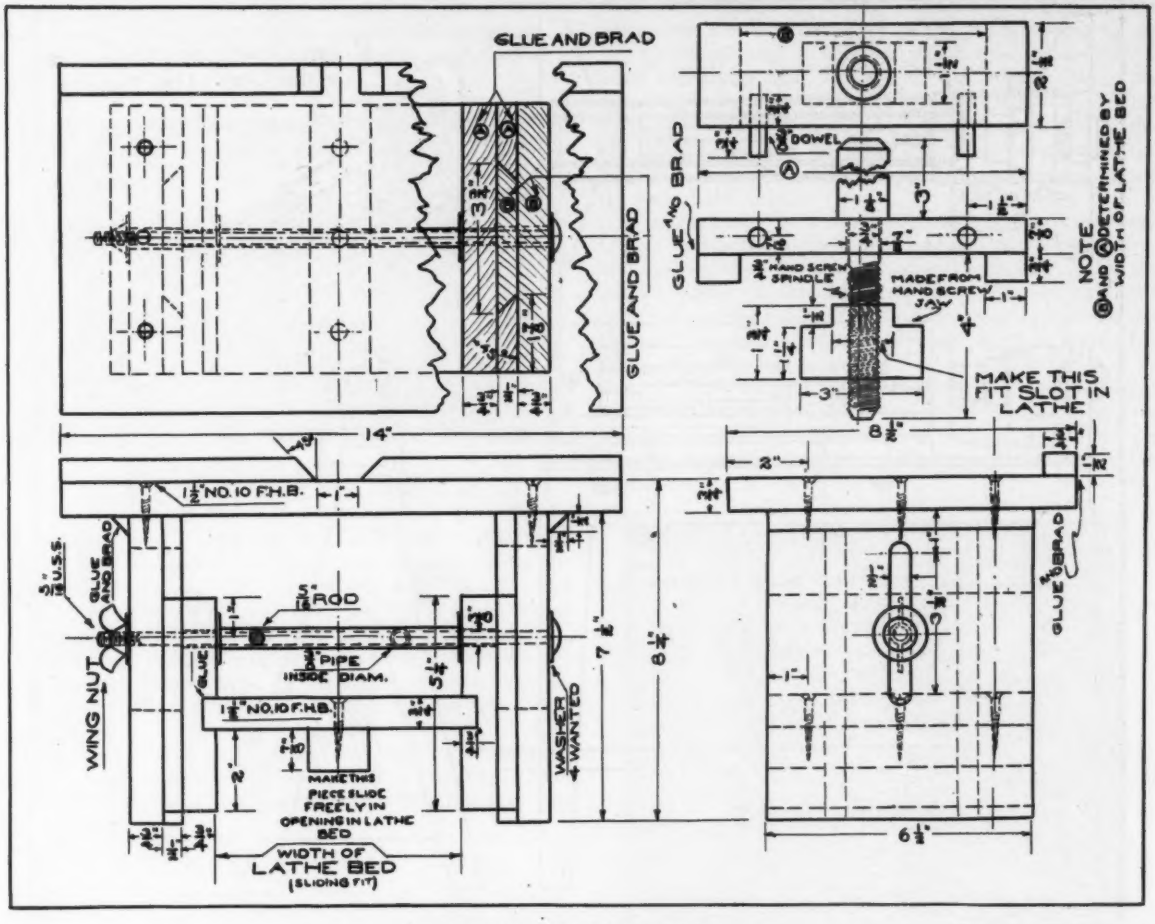
c) Use a very sharp drill and do not force it too fast.

A DRAFTING-ROOM KINK

J. J. Sasser, High Schol, Sour Lake, Texas

Take a ¾-in. paper fastener and break off one of the prongs. Place the broken end of the prong into the slit, which





BORING TABLE FOR LATHE

goes across the diameter of the penholder at the end which receives the pen point. Next, bend the end of the prong so as to touch the pen point about one third of the distance from its end.

When the point is dipped into the ink, the prong of the fastener will form a holder for the ink, and when inking or lettering the ink will gradually be released. This little device eliminates a lot of blots.

BORING TABLE FOR LATHE

William R. Dougherty, Boston, Massachusetts

In a school woodworking shop, there are many times when machine boring is a great advantage over hand boring. My particular shop is not equipped with a boring machine, so with a little thought and labor I constructed the boring table described in this article.

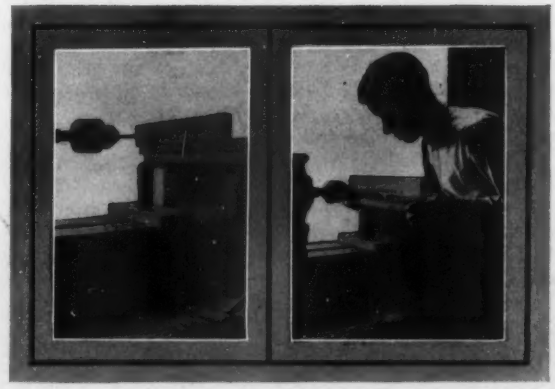
Of course, no boy is allowed to use the lathe and boring table, until he has had plenty of hand boring. After he has demonstrated that he can do a good job, then he may have his chance at the machine.

One of the best tests that a boy can have in accurate boring, is the application of dowels as a means of fastening. If a boy can bore his dowel holes true and make good joints, then why not save him some time for instruction along other lines.

The piece to be bored is placed on the boring table. The table is then raised or lowered to bring the center of the hole to be bored in line with the point of the bit in the chuck. The stop shown in the drawing is then clamped to the lathe bed at the place which will give the hole the desired depth. The table and piece can then be moved forward toward the revolving bit. The stop will regulate the depth of the hole bored.

In regard to the construction of this boring table, there are a few things to be stated which might be of assistance to the builder. A good, hard, close-grained wood, such as birch or maple, should be used for all parts except the top. The latter may be made of white wood or clear pine. When boring holes in the same location in a number of pieces, a thin piece of wood may be fastened on the table top. This piece is used as a *stop* and saves a lot of time laying out centers.

The 5/16-in. rod, used to fix the table at the desired height, is shown with a head on one end and threads and wing nut on the other.



BORING TABLE IN USE

Rather than heating the rod to form the head, the builder may, if he desires, thread both ends and place a square nut on one end. A few taps with a hammer on the end of the rod will prevent the nut from turning off. In this way it may be used as the head of the bolt.

In the section shown in the plan will be noticed the letters A A and B B. Care should be taken in the fitting of these pieces in order to get a nice sliding action. Join the two pieces marked B B on a common center line. Then glue and brad the piece A that is cut at an angle to the large piece A. Before attaching the other piece A that is cut at an angle, put the assembled piece B in place. Insert thin paper between the angular sliding surfaces for clearance. After the second piece A is in place, remove the paper and the slides should then work freely.

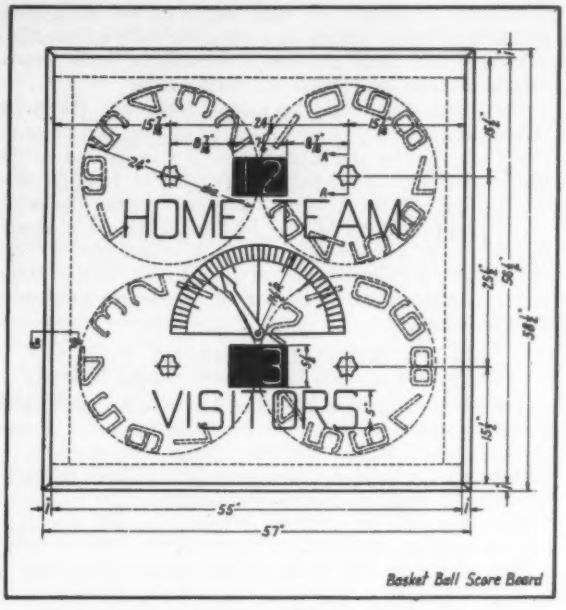
BASKETBALL SCORE BOARD

J. A. Miller, High School, New Kensington, Pennsylvania

The basketball score board is an interesting project for the woodworking class and carries with it an opportunity for supplying additional work for the machine-shop class. The face of the board which is 55 by 56½ in., may be made of ¾-in. pine. To the back of this are fastened 4 disks, each 24 in. in diameter. Two of these are numbered from 0 to 9, and two from 1 to 7 inclusive, as shown in Figure 1.

The method of fastening the disks, and yet allowing them to turn, is shown in Section A-A, Figure 2. A plate is securely fastened to the back of the disk by 6¾-in. No. 12 wood screws and the shaft which has a sliding fit in the bearing is threaded to fit the plate and held in place by a 3/16-in. pin. This pin may also be peened to keep it from working loose.

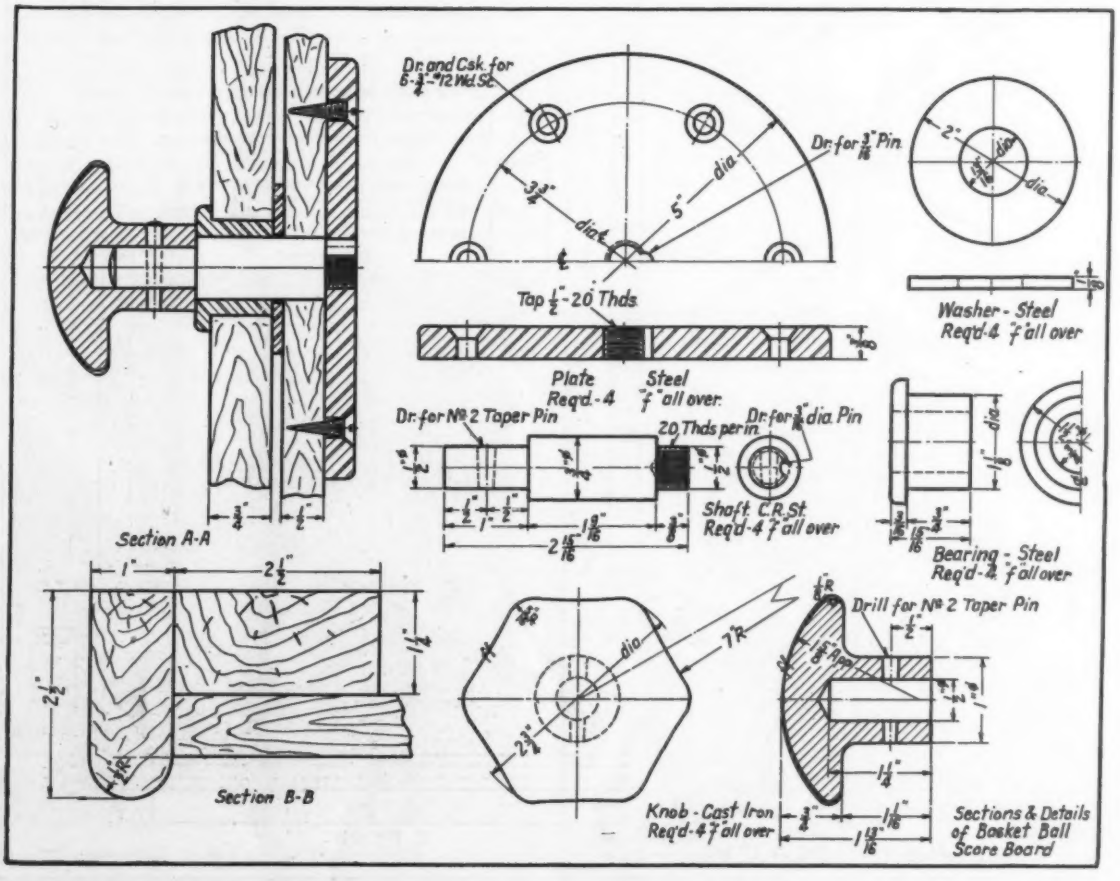
The method of assembling is to tighten the shaft on the plate, insert pin and peen, then fasten to the back of the disk, place washer between board and disk, slip through bearing in main part of score board and fasten the knob with a No. 2 taper pin.



Basket Ball Score Board

Section B-B, Figure 2, shows method of reënforcing board and adding a suitable trim. The board may be fastened to the wall, if desired, by bolting through the 1¼ by 2½ in. reënforcement.

The disks are painted black, the figures are white and so arranged that by turning all knobs in a clockwise direction the figures appear in rotation through the 5½ by 7¼-in.


Section A-A
Section B-B
Plate Reqd.-4 Steel 7" all over
Shaft C.R.St Reqd.-4 7" all over
Washer - Steel Reqd.-4 7" all over
Bearing - Steel Reqd.-4 7" all over
Knob - Cast Iron Reqd.-4 7" all over
Drill for No 2 Taper Pin
Sections & Details of Basket Ball Score Board

opening in the board. The white figure on the black background gives better results than any other color scheme. The disks are ½ in. thick and should be made of well-seasoned lumber. Oak, or birch works out very nicely.

The board proper may be painted white and the words "Home Team" and "Visitors" painted in 5-in. black letters.

A clock showing the playing time is also painted on the face of the board. The hand may be made of 14 gauge steel and the length of the minute markers made to suit the length of the hand obtained. It may be possible to get a minute hand from a large clock or from a demonstration clock face. If not, it is an easy matter to design one to suit. When erected the score board makes a very attractive addition to the gymnasium.

SOME CLAMP RACKS

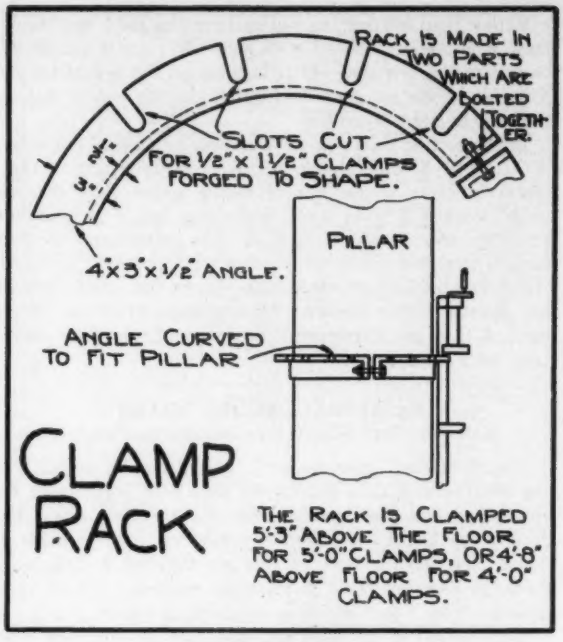
John W. Kurtz, South High School, Omaha, Nebraska

The screw-clamp rack described herewith has been found a very valuable addition to the woodworking shop. The arms were spaced to fit the particular clamps that made up the equipment. The smaller clamps were placed above the larger clamps. The length of the arms was determined by the number of each particular size of clamp on hand. The rack was placed on casters in order to make it portable.

The whole may be made of hard wood and it may be stained or painted to harmonize with the rest of the shop.

The bar-clamp rack was made of angle iron bent so as to fit the circular pillars found in the shop. It has the advantage that it may be removed or adjusted to any height to suit the convenience of the instructor.

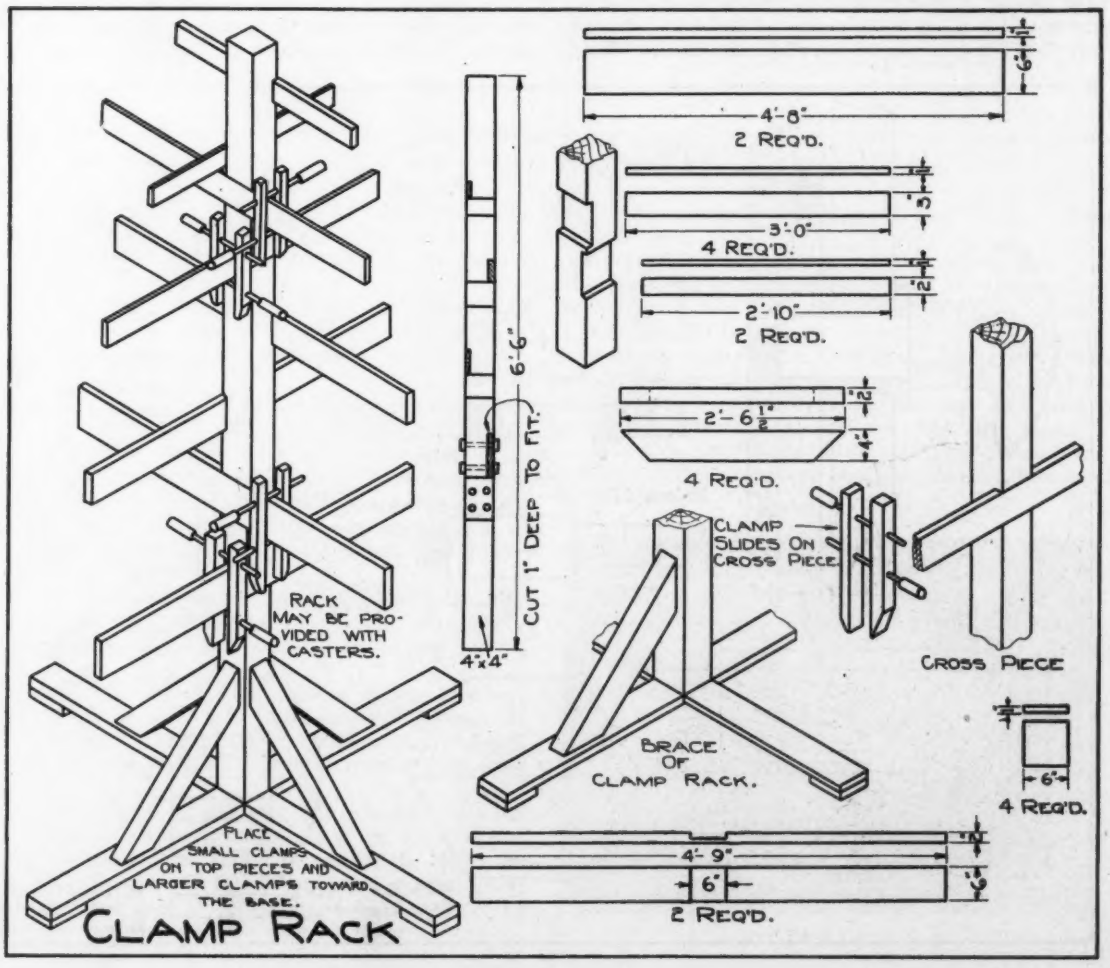
The illustrations are practically self-explanatory and need no further description.


RACK IS MADE IN TWO PARTS WHICH ARE BOLTED TOGETHER.
SLOTS CUT FOR 1/2" x 1 1/2" CLAMPS FORGED TO SHAPE.
3"
2½"
4"x3"x½" ANGLE.
PILLAR
ANGLE CURVED TO FIT PILLAR
CLAMP RACK
THE RACK IS CLAMPED 5'-3" ABOVE THE FLOOR FOR 5'-0" CLAMPS, OR 4'-8" ABOVE FLOOR FOR 4'-0" CLAMPS.

LEATHER STROP

George W. Wright, Roosevelt Junior High School, Amsterdam, New York

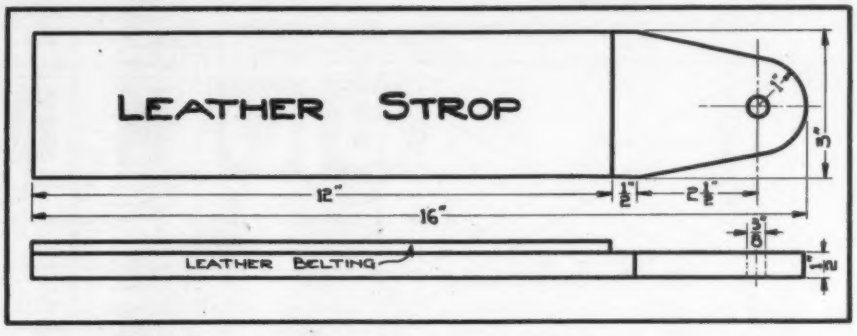
Shop instructors usually have considerable trouble in getting the boys to sharpen their chisels and plane irons properly,



especially in whetting it down to a proper cutting edge. I have seen mechanics and instructors strop a blade in the palm of the hand. This is quite a dangerous practice to show boys and might result in a serious cut.

The accompanying illustration shows a leather stropping stick which has proved very satisfactory in our shop. It consists of a piece of leather belting glued to a piece of wood.

Take a piece of wood about ½ by 3⅛ by 17 in. and glue a piece of leather belting about 3 in. wide and 12 in. long to it, allowing the glue to dry overnight. Scrape off the cold glue and plane the edges of the wood down to the width of the belt. Then square the end and shape the handle as shown.



After a plane iron or chisel has been whetted on the oilstone it should be stropped. A dozen or so strokes will remove what little wire edge or burr is left and leave a cutting edge which is very sharp. Care should be exercised in holding the flat surface of the cutting edge flat to the strop. Do not rely too much on the strop, as it is only soft leather.

This strop is very useful and a blade may be made as sharp as a razor with it. In case the leather gets grit or particles of steel on it, it can be planed off and a new surface obtained. A few drops of oil should be rubbed into the strop occasionally to keep the leather soft.

HAND BRUSH V-SLOT SCRAPER

Harry Moore, Hamilton, Ontario, Canada

The illustration shows a handy scraping attachment for a hand brush such as mechanics use for cleaning out jigs, fixtures, etc. Very often grease and other materials become caked in the V slot, thus making it impossible for the brush to remove it. The scraper is made of sheet steel and cut in a V shape on each end. The V's are then bent outward and the whole is attached to the brush by two rivets. One of the V's is saw toothed so that it breaks up the hard layer of dirt so that the other V can more easily scrape it off. The brush is then used to complete the job.

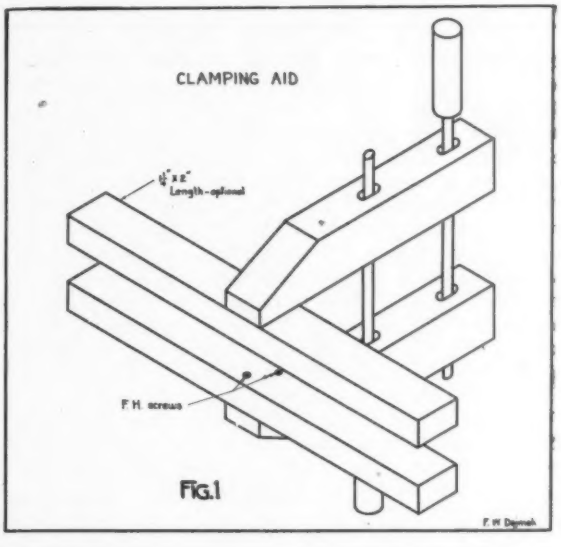
HAND BRUSH VEE SLOT SCRAPER

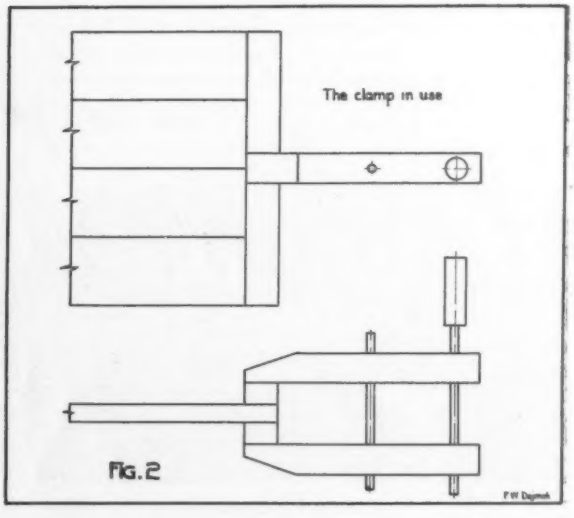
CLAMPING AID

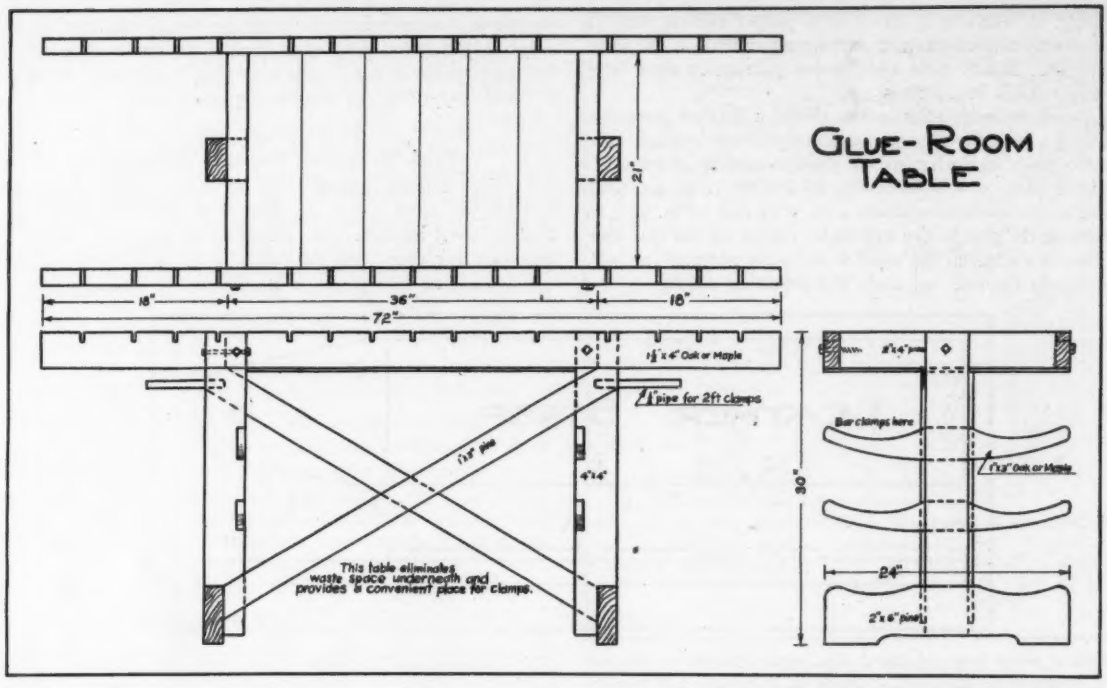
Frank W. Dejmek, Marinette, Wisconsin

In most schools, gluing must be done in the woodshop. Usually, the shop is not as warm as it should be when hot glue is being applied. This condition of the shop makes it necessary for those who use hot glue to work very rapidly.

By fastening two pieces of hard wood to a hand screw as







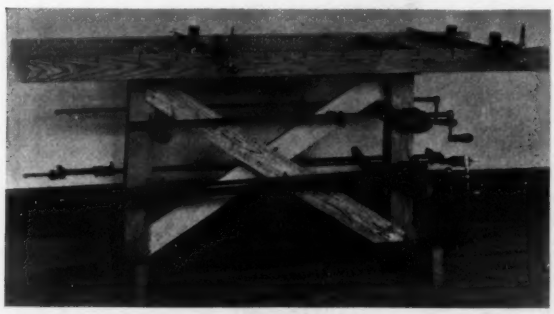
shown in Figure 1 much time can be saved when gluing stock. It is very inconvenient for one person to hold the strips in place and apply the hand screw at the same time. The jaws of these hand screws should be so set that when the screws have been drawn tight, the jaws will be parallel. In case one of these hand screws does not hold the stock in place near the ends of the strips, additional hand screws can be added very quickly. The stock may then be drawn together with bar clamps. Very often the hand screws may be removed as soon as the bar clamps have been applied. However, sometimes it is necessary to leave the hand screws in place until the glue has dried. The strips used on these clamps should be made of close-grained hard wood and should be well oiled to prevent them from sticking to the stock due to the surplus glue that is squeezed out of the joints.

By slightly rounding the surfaces that come in contact with the stock, the wood screws are relieved of any possible strain that might occur in case the jaws are not parallel when the screws of the clamp have been drawn tight.

GLUE-ROOM TABLE

Arnold L. Pearce, Roswell, New Mexico

This table design was developed, as is often the case, through force of necessity. Wall space was at a premium and could not be spared for wall racks for the bar clamps. The space under a glue table is not suitable for the storage of anything but clamps. When the table is made in the manner shown herewith, many clamps may be stored in a way that they are at hand when needed. The various kinds and lengths are placed on separate racks, thereby saving time when in the rush of a gluing job. The construction of the table is simple, making it an ideal project for a group of boys interested in making handy, labor-saving devices for the shop.



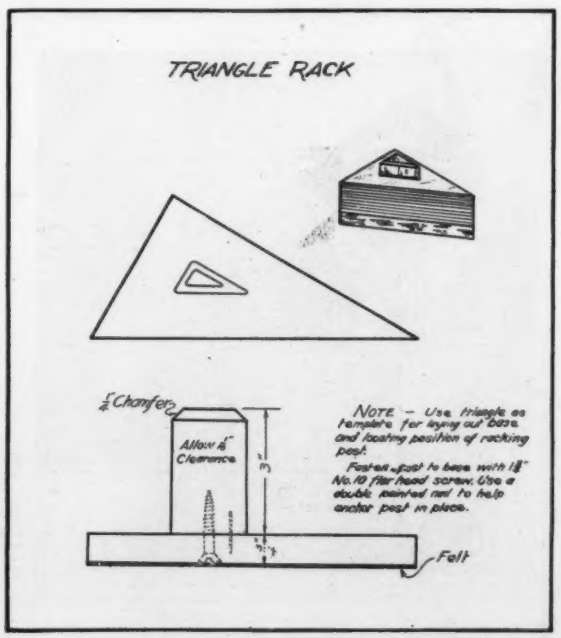
GLUE-ROOM TABLE

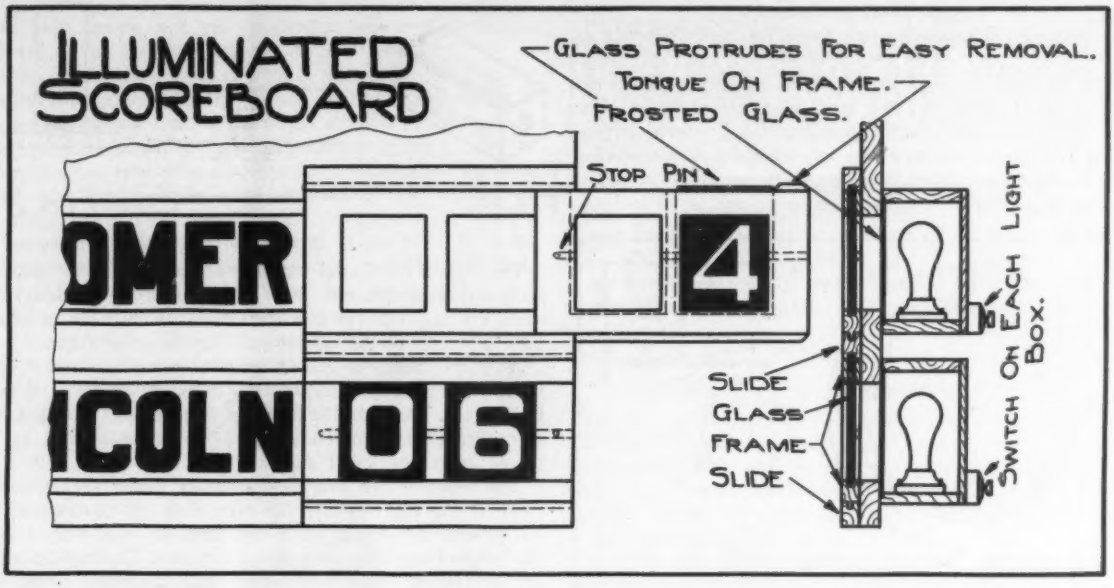
TRIANGLE RACK

Guy A. Pratt, Washington High School, East Chicago, Indiana

The drawing and shop teachers who use the same triangles in all of their classes will find this method of keeping them together, a very convenient one.

The project affords a problem in drawing as well as in woodwork. There are a variety of ways of fastening the post to the base.


TRIANGLE RACK
½ Chamfer
Allow ¼" Clearance
NOTE – Use triangle as template for laying out base and locating position of racking post.
Fasten post to base with 1¼" No. 10 flat head screw. Use a double pointed nail to help anchor post in place.
Felt



Due to the variation in sizes of triangles, dimensions have been left off except those noted on the drawing, it being intended that the triangle be used as a template to obtain the shapes and sizes of the base and post.

The rack may be stained and varnished to match the instructor's desk, or it may be finished with color to suit, and a piece of felt glued to the bottom.

A line may be placed on the post of the rack to indicate at a glance whether or not all of the triangles are in.

ILLUMINATED SCORE-BOARD

Roman M. Hammes, Abraham Lincoln High School, Council Bluffs, Iowa

In connection with the electric timer illustrated on page 33 of the January, 1930, number of the INDUSTRIAL-ARTS MAGAZINE, we now use a device for illuminating the scores also. The device consists of a frame having tongues on both edges which slide in a grooved slide strip. The frame has two openings grooved for the glass slides with the numerals. The numerals are painted or outlined as was explained in the January article. A box with slots cut in the sides must be made to file the glass slides when not in use. Each numeral has a separate light box and switch for the light, so if desired, only one light may burn when the score is in single figures. A frosted glass panel should be placed behind the opening to get a diffused light. A stop pin is used as shown in the drawing to prevent the frame from being pulled out of the slide strips.

The glass panels used were 6 by 7¼ in., but they can be made any size desired. The device was made of wood, but it may be made of sheet metal as well.

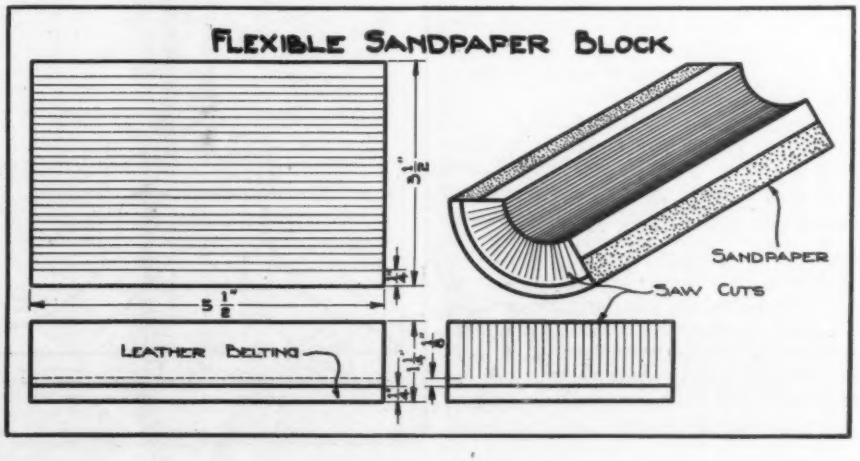
FLEXIBLE SANDPAPER BLOCK

George W. Wright, Roosevelt Junior High School, Amsterdam, New York

The flexible sandpaper block shown in the accompanying illustration is especially useful on concave or convex work. Its real value may be greatest to the patternmaker, but it is very useful to other workers also.

It consists of a piece of soft scrap wood, and a piece of leather belting. The wood should be 1 by 3¼ by 5¾ in. A piece of leather belting must be glued to it after which it is to remain in a clamp overnight. Scrape off the cold glue, plane the wood block down to 3½ in. wide, and square the ends of the block to 5½ in. long. Next, set the marking gauge to ⅞ in. and scribe a line on the end grain of the wood which will leave about ⅛ in. of stock from the glue joint. Now run a series of saw cuts, starting about ¼ in. away from the edge of the block to the marking gauge line as shown in the illustration. The more saw cuts there are, the smaller the radius that can be sandpapered.

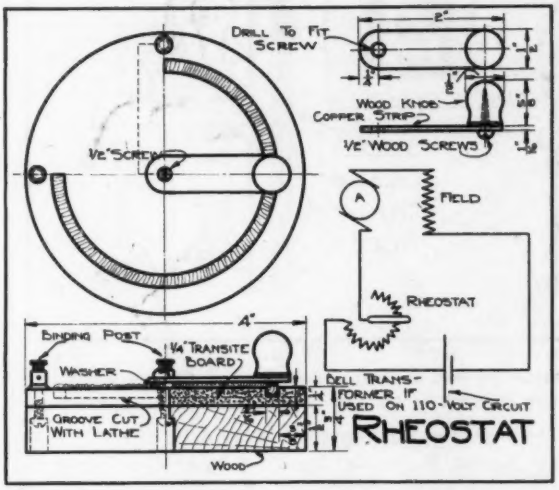
A sheet of sandpaper is usually about 9 by 11 in. and can be torn into 4 pieces about 5½ by 4½ in. Fold a quarter sheet of sandpaper over the leather face, grasp the block and the pressure against the saw cuts will bend the sandpaper block so as to fit most any fair-size radius, either concave or convex.



ELECTRIC RHEOSTAT

Carl v. Lindeman, Western State Teachers College,
Paw Paw, Michigan

The average electrical or general-shop instructor faces the task of what to do with the small pieces of resistance wire and metal left over from the construction of electrical projects. The rheostat shown in the drawing was a project worked out to meet the above. It is simple in construction, yet it teaches a very important lesson in electricity.



The rheostat is constructed as shown in the illustration. Six and one-half feet of No. 22 gauge nichrome wire are found on a ⅛ wire to serve as the resistance unit. The project is next assembled and wired as shown in the diagram. The rheostat can be used for toy motors, shocking machines, and numerous other purposes. The following principles may be learned from the rheostat:

1. What is the purpose of a rheostat?
2. How does the rheostat control the current?
3. What effect does the size and length of wire have on the passage of current?
4. Why should resistance wire be used? Could copper wire be used in its place?
5. Name several uses of the rheostat.

The capacity or resistance of this rheostat may be figured as follows:

Problem: Find the resistance of 10 ft. of No. 22 nichrome wire.

Formula $R = \frac{Kl}{d}$

R = Resistance of wire in ohms
K = Resistance of 1 mil — foot in ohms at 20 deg. C = 670
l = Length in feet
d = Diameter in mils

$$R = \frac{Kl}{d} = \frac{670 \times 10}{25.3} = 264 \text{ ohms}$$

FASTENING THE BENCH TO THE FLOOR

Howard W. Boekeloo, Kalamazoo, Michigan

A problem frequently confronting the industrial-arts teacher is the fastening of drawing or shop-type benches to the floor. While there may be some advantage in having these movable, nevertheless a neat, tidy-looking room depends on a systematic bench arrangement. Where the benches are in a semi-permanent location, small angle irons are sometimes used but unless the screws are removed from the floors the benches cannot be shifted for a temporary change.

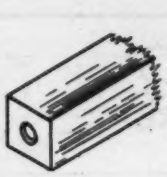


FIG. 1

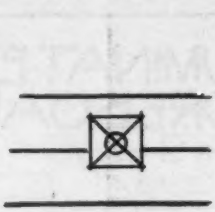


FIG 2

FIG. 3

The writer has found that the scheme shown in the accompanying illustration fits the situation very nicely. A small opening 1 in. in diameter and 3/16 in. deep is bored into the center of the base of each leg, shown in Figure 1.

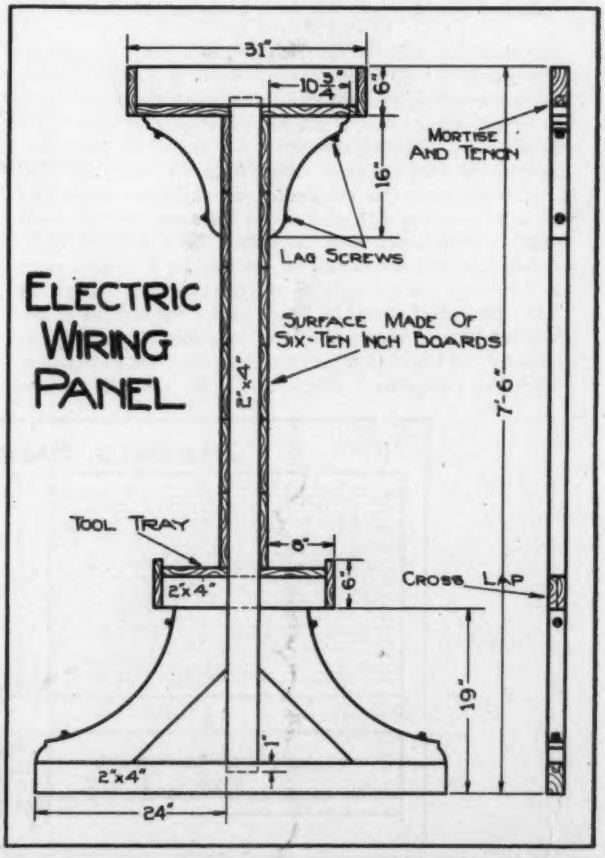
After the bench is placed in its required location a line is traced around each leg and the diagonals drawn as shown in Figure 2. Then into the floor and centered on the diagonals, is driven a 15/16-in. chair glide. The bench is then again placed in its position, Figure 3.

The benches then may be moved by lifting slightly until clear of the glides which, however, form no obstruction to the janitor in mopping the room. They are also easily taken out without any disfigurement to the floor. Chair glides may be secured at slight cost from local hardware stores or manual-training supply houses.

AN ELECTRIC WIRING PANEL

Thomas L. Hutchinson, Central High School,
Dansville, New York

Every electric shop, whether elementary or advanced, needs one or more electric panel. Some panels are fastened to the walls but in many instances, especially in new school buildings, it is not advisable to cover good clean walls and valuable blackboards. So the panel problem confronts us. We



must have panels, and yet no damage whatever should be inflicted to the floor, the ceiling, or the walls.

The only solution, then, is a panel which will stand on its own foundation, independent of walls or floor or ceiling, much the same as a hall tree. It should be sturdy enough to withstand student handling, and be efficient pedagogically in every possible way. The accompanying illustration shows a panel which embodies a few items that are worthy of mention.

The panel, 16 ft. long, has a total height of 7 ft. 6 in. It may be moved about quite easily. It provides more than ample working space for eight boys, four on each side, and ten boys may find it convenient. The tool ledge is fastened at a handy height. It is large enough for all purposes, yet it does not in any way hamper the student by extending out too far. The box on top of the panel is useful for storing materials that are not usually locked away.

The base supports, while very sturdy, do not take up too much floor space.

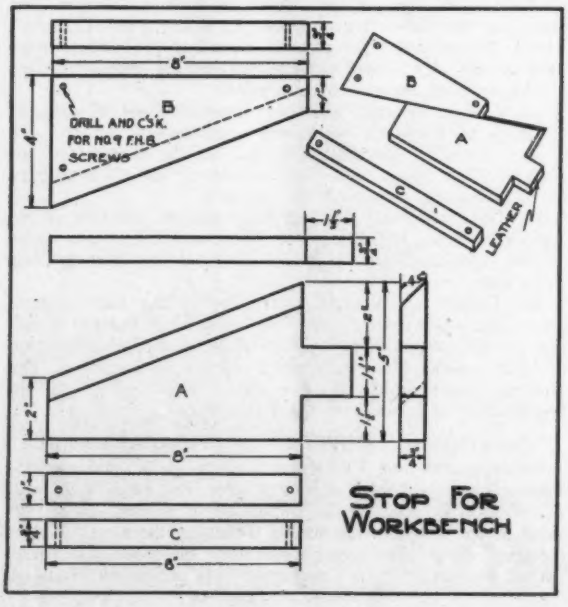
Armored BX cable supplies the panel with current. Four duplex outlet plugs are installed up high enough on the panel, clear of bell work but not out of reach for the student of ordinary height. The upright, top cross, base and tool-tray crosspieces are 2 by 4-in. common Georgia pine. All the facing is of good white pine. The ends may be trimmed with oak to cover end grain. This oak should be finished to match the trim of the school woodwork.

The panel facing may be attached with wood screws so that it may be replaced when that becomes necessary. We find that this portable panel answers our purposes very well. It has proved a fine solution of the panel problem in a school shop where conditions are such that the panels cannot be fastened permanently.

STOP FOR WORKBENCH

Carl v. Lindeman, Western State Teachers College, Paw Paw, Michigan

The bench stop or bench vise described in this article is very handy for the small school shop. Most of the work that is done with a regular vise can be done with this homemade vise. It is made from a piece of oak or maple 8½ by 8½ in., ripped as shown in the drawing, into three pieces. The diagonal is made by ripping it at 45 deg. A piece of leather is placed at the end of piece A to keep the wood from being marred when the clamp is being tightened. The device is fastened to the bench by means of 1½-in. No. 9 screws.



NOW, ARE THERE ANY QUESTIONS?

CORRECT USE OF SPOKESHAVE

921. Q.: Which is the correct way to use a spokeshave, pulling toward the worker or pushing away? I have seen both ways used on the job. — *G.W.*

A.: The spokeshave is usually used in such a way that it is pulled toward the worker. It is easier to handle it in this way. However, for short strokes around curves, it is entirely feasible at times to use it with a pushing stroke.

STAINING LIGHT-COLORED WALNUT

923 Q.: I am making a desk of black walnut. Some of the wood is lighter in color, probably sapwood or near that portion of the lumber. I desire a uniformly dark color in the finish. What treatment could be given the lighter parts so as to give the desired effect? Please give a schedule for the finish of the desk. — *L. A. H.*

A.: The walnut desk should be sponged with warm water, dried, sanded with split 4/0 paper, dusted, and all light colored portions coated in with a half-strength water stain. Before these parts have entirely dried, the entire case should be gone over with a full-strength solution, starting with the parts seen the least and ending with those seen the most. Let dry overnight.

Without sanding apply a coat of orange shellac diluted with 4 parts of denatured alcohol. Dry hard and sand with a split 6/0 paper. Dust off and fill with a dark-brown, chocolate-colored filler, carrying about 12 pounds of filler base per gallon of thinner. Clean off well and let dry 48 hours.

Apply a coat of four-hour varnish and dry overnight. Sand with split 6/0 paper, dust off and revarnish. Repeat for as many coats as may be deemed necessary and rub the last with FFF pumice stone, crude oil, and felt pad. Saturate the pad of cotton flannel with water, smear with some of the oil and pumice-stone rubbing sludge, and use straight-line rubbing to produce that fine soft effect so desirable on walnut. Clean up with a good polish. — *Ralph G. Waring.*

WATERPROOF CEMENT FOR CANVASING CANOES

924 Q.: We wish to glue the canvas to a canoe. Could you give me instructions for waterproofing plain hot glue and how it must be applied? — *J. C.*

A.: Make up a solution of a good-grade cabinetmaker's glue, which, when hot, will give a ¼-in. glue bridge between the finger tips when they are dipped in the hot glue and then slowly stretched apart. To this hot glue, add ⅛ part of boiled linseed oil, stir well and cook over a water bath for about an hour. For every quart of glue thus prepared add 2 oz. of Formaldehyde just before using.

Line up the canvas correctly on the keel line of the upturned canoe, which should be held rigid in any convenient manner. Use a clean, wide-bristle paint brush to apply the glue thickly and evenly to the wood. Draw down the canvas evenly as the gluework progresses and use a new fiber scrub brush to force the canvas down to the glue. After the side has been glued and canvased, use an electric flatiron, or warm sadiron to press out all blisters and waves, starting with the keel line and working toward the gunwales. The molding for the latter should be put on after the canvas has been glued and tacked along this line. In the case of laps occurring on the bow and stern lines good joints can be had by overlapping both side canvases, holding down firmly and then cutting on the center line with a very keen knife. The seam may then be tacked with copper tacks and the face molding brass screwed in place. Let dry one week before painting with a thick lead-and-oil primer. Let dry hard, sand smooth with

2/0 paper, dust off and apply a coat of four-hour enamel, which, if made by a reputable company will be found most excellent for this work. Sand each coat with a 4/0 split paper to knock off the gloss and apply as many coats at 48-hour intervals as may be desired. — *Ralph G. Waring.*

ELECTED CHAIRMAN OF W. A. A. INDUSTRIAL-ARTS SECTION

Mr. George C. Donson, who was selected chairman of the industrial-arts section of the Western Arts Association for 1931, is director of industrial arts at the Washington High School, Washington, Pa. Mr. Donson is a graduate of the Washington and Jefferson College, and has done graduate

GEORGE C. DONSON
Chairman, Industrial-Arts Section,
Western Arts Association

work at the University of Chicago and the University of Pittsburgh. He is a very active member of various educational organizations and has held offices in the Vocational Society of Washington County and the Industrial Arts Association of Pittsburgh and vicinity. He also is a frequent contributor to professional magazines.

MR. HOLTON RETIRES

Mr. Edward E. Holton, head of the department of machine-shop practice and instructor in mathematics of the Springfield, Mass., Vocational Technical School has retired at the age of 70. Mr. Holton has been active as a teacher for 54 years and has had wide experience as a draftsman, designer, shop foreman, and superintendent. He is known to many through the textbook on shop mathematics, which he wrote. His retirement takes place due to the operation of the Massachusetts Teachers' Pension Law. On June 10 the instructors of the Springfield Township High School tendered a reception to Mr. Holton and presented him with a purse of $50 in gold.

¶ Mr. Maurice M. Thompson, formerly head of the industrial-arts department at River Rouge, Mich., has accepted a position as instructor of drafting in the Waukegan Township High School, Waukegan, Ill.

¶ Mr. P. C. Brooks, formerly principal of the State Secondary School at Jackson, Ala., has commenced his duties as assistant state supervisor of vocational-agriculture education. He will be in charge of the teaching of vocational agriculture in southern Alabama.

¶ Miss Leona Davis, formerly assistant county extension agent at Broken Bow, Nebr., has been appointed as state extension agent for the State College of Agriculture. Miss Davis has completed two years as assistant county extension agent. She is a graduate of the University of Nebraska and holds a degree in home economics.

¶ Mr. Glenn H. Ament, for the past two years teacher of vocational agriculture at Meeker, Colo., has been elected to take charge of vocational agriculture, under the Smith-Hughes Act, in the Washington County High School at Akron, Colorado. Mr. Ament is a graduate of the Colorado Agricultural College.

¶ Mr. Harry Smith, of Bryan, Texas, has been elected by the school board of Bay City, Texas, as vocational teacher in the Bay City public schools, to take the place of Mr. R. D. Rawls, who left to teach in another part of the state.

THE A. V. A. CONVENTION

According to Dr. R. L. Cooley, director of vocational education, Milwaukee, Wis., all of the local committees for the American Vocational Association convention to be held in Milwaukee, December 10-13, 1930, have been appointed. Arrangements to give the members of the A. V. A. a hearty welcome are well under way.

The visitors to the convention will be especially interested in the Milwaukee Vocational School, the Boys' Technical High School, the Girls' Trade School, the prevocational schools, and a number of junior and senior high schools, all of which are worthy of study.

The following have been appointed as chairmen of the various committees: Executive committee, R. L. Cooley, chairman, F. A. Maas, secretary; general committee, R. L. Cooley, chairman, F. A. Maas, secretary; state committee, George P. Hambrecht; finance committee, Wm. F. Rasche; publicity committee, F. A. Maas; banquet committee, Thos. W. Boyce; music committee, J. E. Skornicka; printing committee, I. D. Pilliard; entertainment committee, John Lasher; exhibit committee, R. B. Otis; registration committee, John Tepoorten; service committee, H. P. Hurley; and information committee, R. W. Tarbell.

NEW YORK CITY INDUSTRIAL TEACHER-TRAINING STUDENTS MEET

The students of the Industrial Teacher-Training Classes of New York City, closed the year with a banquet and dance at the Hotel Brevoort on Thursday, June 12, 1930. About 200 persons were present, including prominent members of the city school system and several representatives of the state department of education.

Dr. Joseph Sheehan, associate superintendent of schools, in charge of vocational work, was toastmaster.

Miss Florence Marshall, principal of the Manhattan Industrial High School for Girls, addressed the 83 graduates on "Professional Standards of Teachers."

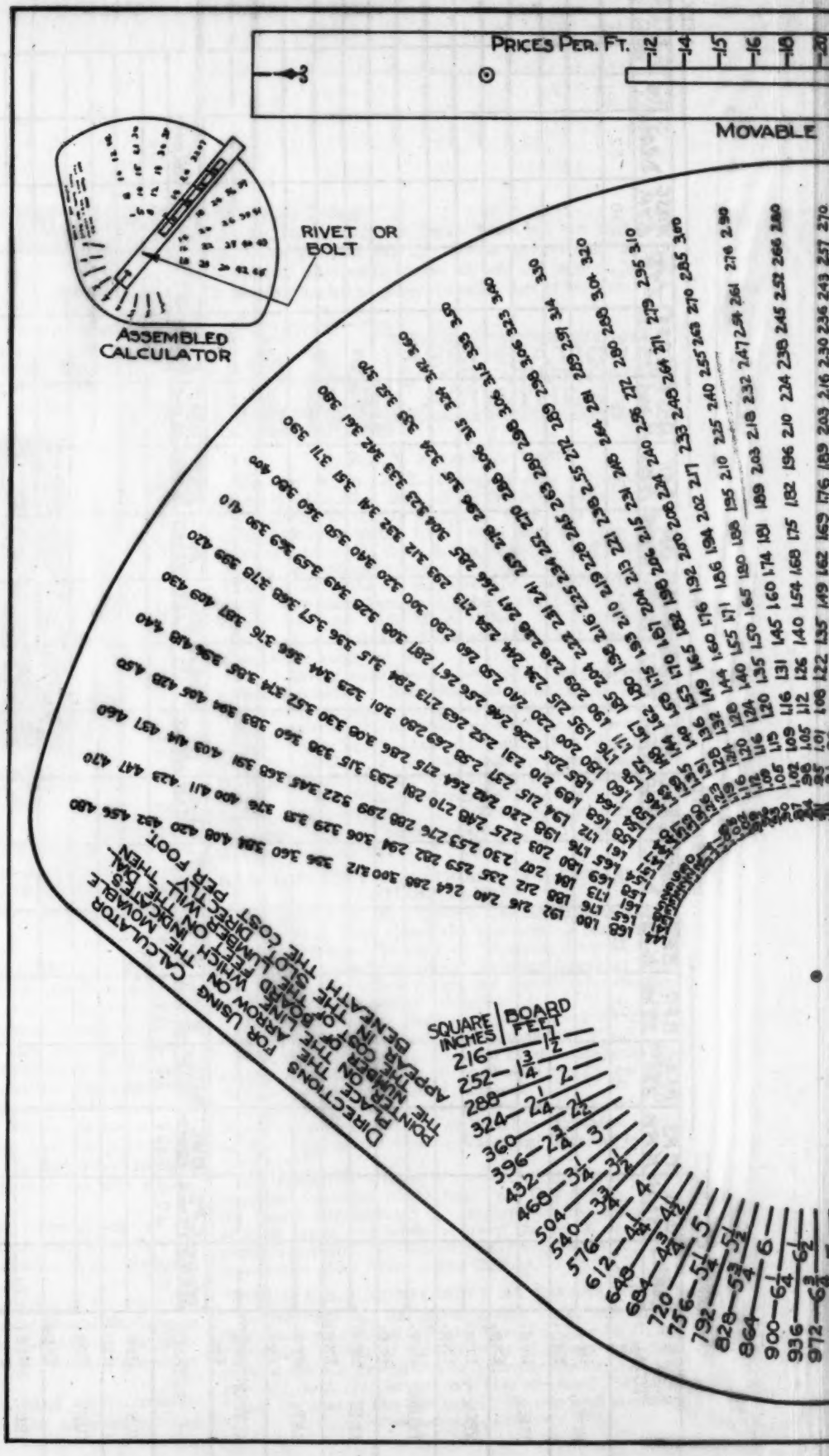
Mr. Oakley Furney, chief of the industrial division of the New York State Department of Vocational Education, spoke on the "Opportunities Open to Vocational Teachers in New York state."

Mr. Gilbert G. Weaver, a member of the state department and supervisor of the New York City Teacher-Training Center, congratulated the graduates on the completion of their course and briefly reviewed the year's work. The students presented Mr. Weaver with a very beautiful gift in appreciation of his efforts during the year.

VOCATIONAL CONFERENCE AT EAGLES MERE

Between 600 and 700 industrial-arts, trade, and agricultural teachers assembled at Eagles Mere, Pa., June 26, 27, and 28. William C. Ash, of the University of Pennsylvania, presided at the first general session Thursday morning. At this meeting, G. A. McGarvey very ably discussed the topic, "What Becomes of Our Graduates." He presented a number

(Continued on Page 16a)



Calculator, Designed by L. H. Hodges, Central

To be blueprinted or mimeographed for School Shop Use Only
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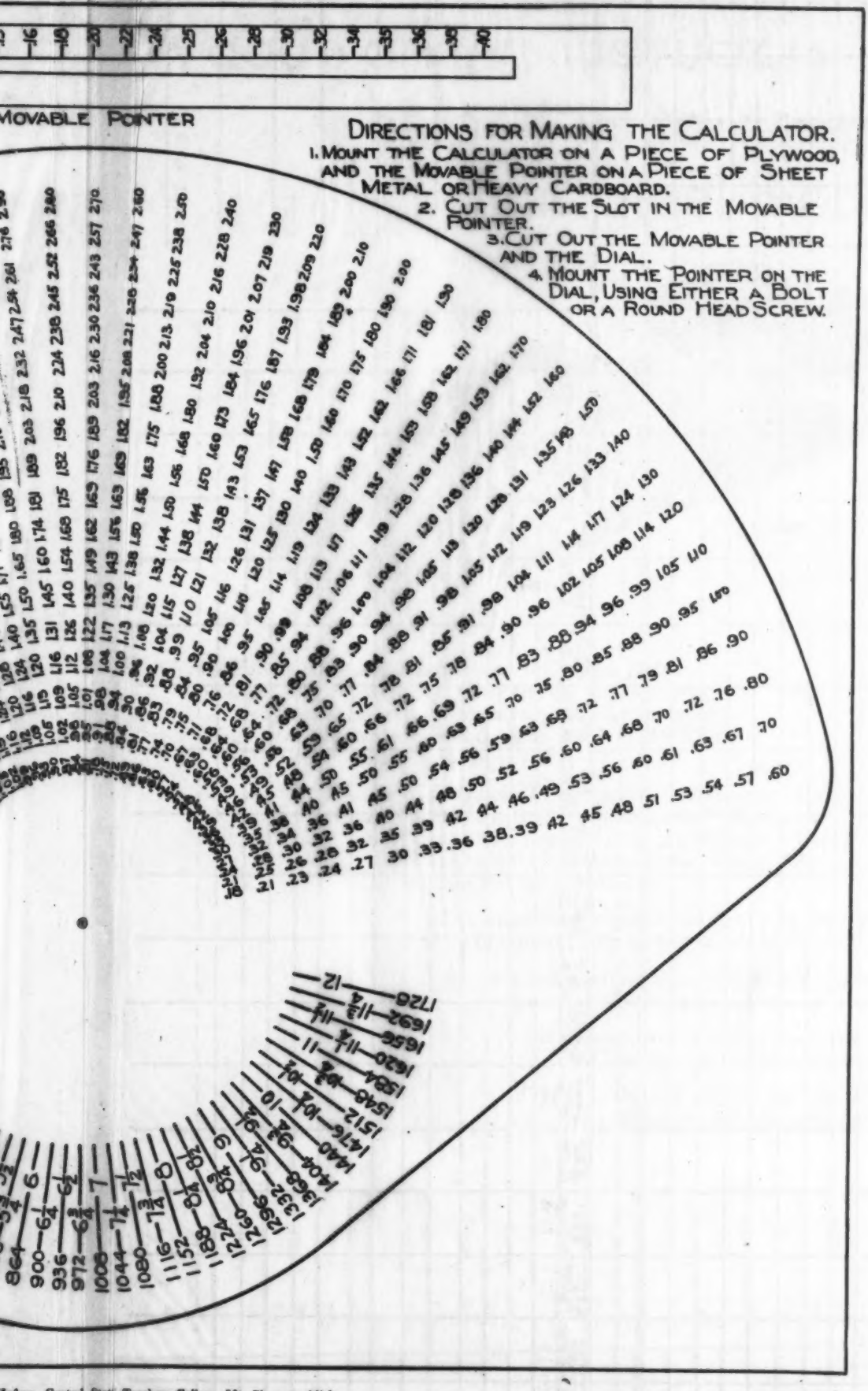
MOVABLE POINTER
DIRECTIONS FOR MAKING THE CALCULATOR.
1. MOUNT THE CALCULATOR ON A PIECE OF PLYWOOD, AND THE MOVABLE POINTER ON A PIECE OF SHEET METAL OR HEAVY CARDBOARD.
2. CUT OUT THE SLOT IN THE MOVABLE POINTER.
3. CUT OUT THE MOVABLE POINTER AND THE DIAL.
4. MOUNT THE POINTER ON THE DIAL, USING EITHER A BOLT OR A ROUND HEAD SCREW.

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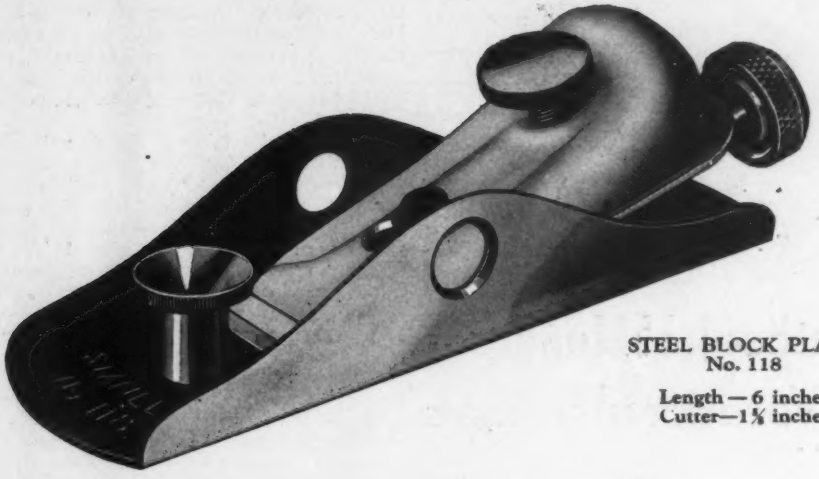
Woodworking instructors helped us to design this Steel Block Plane



STEEL BLOCK PLANE
No. 118

Length — 6 inches
Cutter—1⅝ inches

THIS is an acknowledgment with thanks for their help. A simple, "boy proof" block plane for the school shop was requested. After experimenting with several designs, the No. 118 All-Steel Block Plane was approved.

The School Block Plane has a minimum of parts and is practically unbreakable. The cutter is held at a low angle. Lever cap is made of steel and is fitted with a large thumb screw that cannot be lost from the cap.

The finger rest is permanently fixed. No mouth adjustment or lever cap screw.

We recommend this Steel Block Plane as being the ideal block plane for school use.

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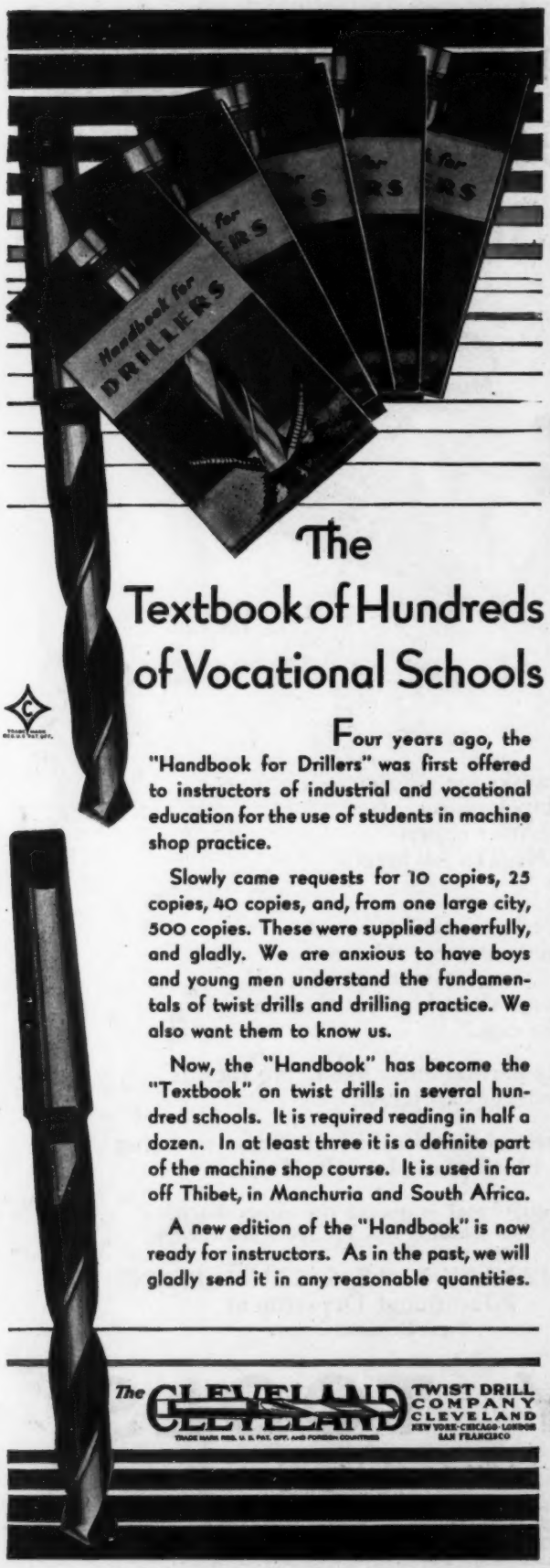

Handbook for DRILLERS
The
Textbook of Hundreds
of Vocational Schools
Four years ago, the "Handbook for Drillers" was first offered to instructors of industrial and vocational education for the use of students in machine shop practice.
Slowly came requests for 10 copies, 25 copies, 40 copies, and, from one large city, 500 copies. These were supplied cheerfully, and gladly. We are anxious to have boys and young men understand the fundamentals of twist drills and drilling practice. We also want them to know us.
Now, the "Handbook" has become the "Textbook" on twist drills in several hundred schools. It is required reading in half a dozen. In at least three it is a definite part of the machine shop course. It is used in far off Thibet, in Manchuria and South Africa.
A new edition of the "Handbook" is now ready for instructors. As in the past, we will gladly send it in any reasonable quantities.
The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK-CHICAGO-LONDON
SAN FRANCISCO

(Continued from Page 326)

of charts which showed clearly into what trades or professions most of our graduates go.

Francis E. Shugert, personnel director of the Ajax Hosiery Company, Phoenixville, explained their cooperative plan of training for employees and the methods of selecting knitters.

C. F. Bauder, of Philadelphia, discussed "The Place for the Technical Industrial Course." He said that the technical course is not a substitute for the unit trade course, but that it can be provided at lower cost as less expensive equipment is needed. Then, too, the Capper-Reed vocational subsidy may be available for this kind of work.

At the general industrial session Friday morning, L. H. Dennis presided. Dr. Robert C. Shaw of the state department, spoke for Dr. Keith who was unable to be present. Dr. Shaw emphasized the place of the home, the school, and the church in our system of education.

Dr. J. C. Wright brought the greetings from the Federal Board and spoke about the provisions of the Capper-Reed Bill.

The principal speaker at the general session Friday night was Dr. C. M. Miller, state director of vocational education, for Kansas. Dr. Miller spoke on "Special Features of the Proposed Federal Vocational Education Legislation."

At the meeting of the Pennsylvania Vocational Association, Friday evening reports were given by V. A. Martin, secretary-treasurer, Edith Davidson, managing editor of the *Vocational News*, and Ted Seidle, the editor. George H. Parkes, of Williamsport, was elected vice-president of the industrial section. Margaret Glossner, president of the P. V. A., presided at the meeting. The industrial-arts program comprised the following sections: industrial arts, electrical, metal, printing, related, woodworking, and cooperative industrial.

One of the special features of the Saturday morning session was the reports given by men who had been selected before the convention to make these reports. Mr. W. E. Brunton of the state department, was in charge of this special feature.

At this meeting, Dr. Kirby spoke about the improvement of the design in industrial-arts projects. Mr. Lois Lerda of State College, made a report of a careful and exhaustive study on the general shop.

S. L. Coover made an excellent report of a questionnaire study he made of general-shop equipment and Lester H. Fehr of general-shop projects. Wayne E. Steiner discussed the "Junior Mechanics Club." E. E. Howard gave an interesting discussion of completion standards and reviewed the A. V. A. standards as published in the INDUSTRIAL-ARTS MAGAZINE last May.

Otto Borman presented the findings of a survey on grading, and Harold Mancill reported on an interesting survey on "Desirable Building Specifications for Industrial-Arts Shops."

The subject of equipment for the various shops was ably discussed, and the minimum, moderate, and maximum equipment for unit shops based upon questionnaire studies in Pennsylvania will make a valuable contribution to our industrial-arts literature.

Fifteen members of the Ship, under Waldo Wright, captain, were present and distributed many useful prizes when the drawing was held.

The school exhibits from a number of schools in the state not only gave one an idea what is being done but also gave good suggestions for future work.—*George C. Donson.*

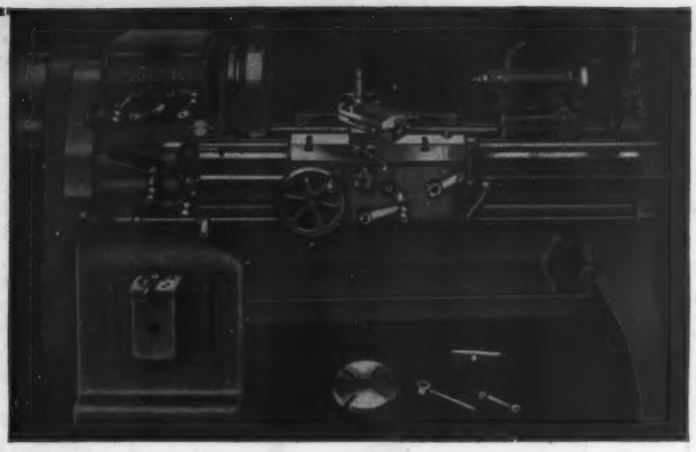
MINNESOTA VOCATIONAL TEACHERS' MEETING AT MINNEAPOLIS, MINNESOTA

The Industrial Education Section and the Minnesota Vocational Education group will hold their annual meeting October 31, at Dunwoody Institute, Minneapolis, Minn. At the general session on Friday morning, there will be a joint meeting of the sections in agriculture, home economics, commerce, and industrial work. The afternoon will be devoted to round-table conferences for teachers of metal work, drafting, electricity, auto mechanics, woodworking, printing, sheet-metal work, visual education, and home and farm mechanics.

Mr. R. W. Selvidge, of the University of Missouri, will be one of the principal speakers at the joint meeting.

(Continued on Page 19a)

The 14"
GOLD SEAL
(Timken Bearing)
Lathe
"Ideal For School Shops"



Built to meet the needs of high speed, heavy duty industrial production, the ready adaptability of the 14" Gold Seal Lathe to all kinds of work, together with its absolute safety to the operator, has made it the ideal lathe for the school shop. This machine combines the very latest features of modern lathe construction with a complete simplicity of operation that makes the student's work interesting, rather than a maze of complicated mechanism. Investigate this new machine NOW!

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TIMKEN BEARING EQUIPPED

(Continued from Page 16a)

COMMITTEE TO REVISE GENERAL SHOP COURSE

At the annual meeting of the Southwestern section of Industrial Arts Teachers of Michigan, a committee was appointed to revise and rewrite a course of study for the general shop. The committee is composed of Mr. Carl v. Lindeman, chairman, Mr. Woods of the Western State Teachers College, and Mr. Harris of the Marshalls schools. Mr. K. Smith, state supervisor of industrial education serving as adviser.

Lathers' and Plasterers' Craft Problems and Reference Book

By Harry J. Hagen. Paper, 148 pages, 6⅛ by 9¼, illustrated. Price, $2. Published by Craft Problems Distributor, 4005 Lexington Ave., St. Louis, Mo.

This reference book contains a great amount of technical information for the lather and plasterer. It is profusely illustrated and shows the practical way of laying out work for artisans in the two trades mentioned in the title.

Industrial Hygiene for Schools

By Jesse F. Williams and Delbert Oberteuffer. Cloth, 280 pages, 5¾ by 8¼, illustrated. Price, $2. Published by McGraw-Hill Book Co., Inc., New York, N. Y.

This book gives a fairly complete presentation of the problems of health in industry. It is unfortunate that the majority of the cuts used in illustrating this book have been borrowed from other publications. They do not, in many instances, present the facts in the best way, and their improvement would make the book much more useful as a text.

The Art of Whittling

By Walter L. Faurot. Cloth, 91 pages, 5⅜ by 8, illustrated. Price, $1.35. Published by The Manual Arts Press, Peoria, Ill.

Anyone interested in the ancient and honorable pastime of whittling will find this little book replete with interesting examples of what may be done with the common jackknife and a suitable piece of wood.

Elementary Wrought Iron

By J. W. Bollinger. Cloth, 139 pages, 5¾ by 8⅞, illustrated. Price, $1.32. Published by The Bruce Publishing Company, Milwaukee, Wis.

This book on wrought-iron work will be welcomed by the junior-high-school teacher. The book is divided into three major divisions: The first one on materials and tools, the next one on operations, and the third one on projects.

In the section on operations the teacher will find many kinks and devices that will help the boy to do his wrought-iron work in a much better manner. The section on projects contains many fully dimensioned plates, giving a large number of examples of what may be accomplished by the junior-high-school boy. The illustrations throughout the book are so arranged that the boy will have little difficulty in laying out the scrolls and designs used in building up his project.

Building and Metal Trades — My Life Work Series

By Robert L. Cooley, Robert H. Rodgers, and Harry S. Belman. Cloth, 218 pages, 5⅞ by 8¼, illustrated. Price, $1.75. Published by McGraw-Hill Book Co., Inc., New York, N. Y.

This is the first volume of a series of four which will give occupational information to the student of secondary schools and part-time vocational schools. The building trades and the metal trades are the subjects of this volume, and the

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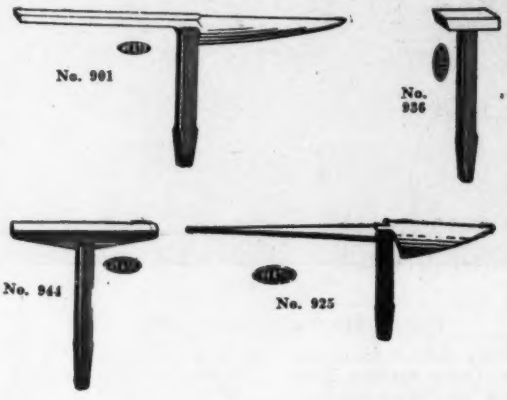
STAKES



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(Continued from Page 19a)

occupations of the carpenter, bricklayer, plumber, electrician, painter and decorator, sheet-metal worker, plasterer, steamfitter, structural-iron worker, draftsman, patternmaker, molder and the coremaker, machinist, tool and dyemaker, forgeman, welder, and the boilermaker are quite fully described.

The general divisions of each trade are taken up under the captions: Importance of the occupation, tools and materials used, conditions under which work is done, future of the occupation, stability of the occupation, what the worker in the occupation must know, physical and personal qualities required, apprenticeship training, promotional steps, and value of education in securing promotion.

The book is well illustrated with pictures that show actual trade conditions in most instances.

The Radio Amateur's Handbook

By A. Frederick Collins. Cloth, 34 pages, illustrated. Price, $2. Published by Thomas Y. Crowell Company, New York, N. Y.

This is the sixth edition of this handbook. It has been entirely reset and all of the material has been brought up-to-date. Several new chapters have been added and the amateur interested in knowing how to build a radio set or how the radio which he already has, works, will find it a mine of valuable information. A chapter has been added on radiovision which is the next problem for the amateur to attack.

Some problems of the General Shop and Other Studies

Edited by William T. Bawden. Paper, 35 pages. Price, 10 cents. Published by the Manual Arts Press, Peoria, Ill. A report of the nineteenth annual manual-arts conference held in December, 1928, at St. Louis, Mo. Contains abstracts of papers on the general shop plan, reorganization of methods for larger classes, the handling of tools and supplies, standards in the junior high school, and the place of manual arts in the senior high school.

Speed Typewriting

By M. N. Bunker. Published by the Occult Publishing Co., Chicago, Ill. A short cut to rapid typewriting, self-taught in sixty hours.

Courses of Lectures, Gallery Talks, Study Hours, and Story Hours at the Metropolitan Museum of Art, New York City, for the year 1929-30

The subjects and lectures have been chosen with care and are intended to offer material of special interest to students and teachers. The Museum welcomes suggestions from the school authorities and teachers for further service which it may render.

Industrial Work for Handicapped Children in New York City

Miss Caroline G. Ronzone, inspector of industrial work for handicapped children in New York, in a recent report, calls attention to the fact that the character of the work is proof that the individual instruction in industrial lines, given to the teachers of handicapped children, has been skillfully carried over to the children.

Industrial work for these children has been extended to 410 classes, with a total registration of 8,555 pupils. At the school for the deaf, new industrial rooms were equipped for the teaching of jewelry, engraving, upholstery, bookbinding, advanced sign painting, straw sewing, and flower making. Advanced work in lettering and posters has been introduced in the school for the deaf and in the classes for crippled and cardiopathic children.

A plan for grading of industrial work for these children has been tried out, to enable those in charge to determine the educational value of the work in grades 1A to 4B, and its trade value in grades 5A to 8B.

An additional teacher has been assigned to the office to provide closer supervision in the classroom and to offer more personal help for the pupils and teachers.